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DEFENCE OF THE FOUR-SHIFT ROTATION, IN ANSWER TO W. B. H.

To the Editor of the Farmers' Register.

Westover, March 10th, 1835.

It has been my intention for some time past, to answer the objections to the four-field and fallow system, set forth in a communication under the signature of W. B. H., in your January No.; but have been prevented from doing so, at an earlier period, from obstacles not altogether within my control. I am prompted to such a course, not for the mere sake of writing, (for there is nothing that I abominate more) but in vindication of practical opinions, advanced by myself in a former essay—viz. the recommendation and justification of the four-field and fallow system. I will not feign ignorance of the author of the communication alluded to; no, I feel a pride in acknowledging that it has sprung from so high a source: for it could not have originated from one that I more highly respect and esteem, and whose opinions would command more consideration—and an admonition of my *imprudence*, in recommending any particular system, comes with mighty force from that respected writer. But he must pardon me for entertaining such confidence in my agricultural opinions, as have resulted from experience; and which have been countenanced and approved by better heads than mine. The objections and arguments of my friend seem plausible enough, and if not properly considered, tested, and refuted, must consign to oblivion all that I have before said in vindication of the system I have recommended to the public. My object in the present essay, therefore, is to refute, as far as it is in my power, the objections which have been urged, and to place the system, if I can, upon stronger grounds, by yet stronger testimony in its favor.

But before entering upon the main subject of this essay, let me express my entire concurrence with W. B. H. in the opinions he has expressed, with regard to the four-field system of *Arator*. Yes, and let me go a step farther, and say, that if the theory and practice of that great agriculturist and public benefactor had been persisted in, and not received the frowns of prejudiced men, Virginia would long ago have been aroused and resuscitated from her impoverished condition, and would now be ready to adopt the more rigid and profitable system of three successive grain crops in four years. There is a tendency in human nature to mar and throw a shade over the enterprising and laudable intentions of some. Perhaps this is a frailty inherent in us. But at the same time that I agree with him in justifying the system of Arator, I must express my astonishment at his concurrence with that highly intelligent gentleman, Mr. John Wickham, in condemning the adoption, more generally, of the four-field and fallow system. Yes, a system which I understand one or both have adopted, and are now practising. It does not appear either generous or consistent, for a farmer to denounce to others, a system which he pursues with perseverance and profit. Can it be that my learned friend designedly acts against his own precepts? *Video meliora probaque, deteriora sequor.* It may be said that this system has been tried, and that it will not do. Let me tell W. B. H. that he has plucked it in its bud, before it has unfurled itself for him to reap its full benefit. It is condemned before it has had a fair trial, or one round of crops. I would ask, has it not paid him well? Has it not cleared his land of all pests, and improved its fertility? And is not his farm in a better state to afford him both pleasure and profit than before he commenced it? I must be vastly mistaken if it is not; and can assure him, that it will carry with it both profit and improvement as its rotation rolls around.

As I am furnished with no written data, by those who pursue the three-field course, (which seems to me to be rather unkind,) I shall be governed in the comparisons I may make, by my own observations, and what information I have been able to collect from many highly respectable and intelligent gentlemen who have pursued it; and therefore shall be regulated by their practices and results, both on large and small estates.

The first objection of W. B. H. which he deems "insuperable, is its expensiveness, which expense, consists in keeping a supernumerary number of horses, which are only employed at one season of the year, (and that the fallowing season) and kept at a heavy expense the rest." I will ask the gentleman what number of horses would be necessary for the judicious cultivation of a farm of 400 acres under the three-field course? I use twelve mules. With this team I fallowed with ease this fall 100 acres, in five weeks; and during the greater portion of this time the season was excessively dry. Now, *vice versa*, let me ask what this team would have been employed about if they had not been fallowing? Why, I should say idle; and consequently supported at a "heavy expense." For, after the wheat is thrashed, and the corn laid by, which is always accomplished by the middle of August, the teams would have nothing to do until seeding time, were they not employed in this. I should therefore think the labor much more equally distributed under the four than the three-field course. I have never yet seen the day that my teams had not as much as they could do; and sincerely think the fallow season for wheat is the most leisure one we have. The ploughs are kept running at their leisure, having nothing to interrupt them, while the manual labor is employed in gathering and securing the fodder, &c. The fallow field is always ready, and frequently (by the time the corn would admit of being removed,) we have ploughed much of our corn land before the season had arrived for seeding. Many persons have been deterred from fallowing, in consequence of the droughts. I have never yet been compelled to stop a day from that cause, and know I have as stiff land to encounter as any one. It may be attributed in a great measure, to the peculiar advantages of our system,

viz: the non-grazing, and the constant stirring of our soil. The land is so frequently turned over, and that deeply, that it never becomes so very hard and tenacious as to cause a suspension in our operations. It is also mellowed and kept porous by the shade and roots of the clover, and the great quantity of other vegetable matter which is given to it. It is worthy of consideration, too, that three-fourths of the entire farm receives the ameliorating effects of the frost. It is true, that I have found it advisable for the relief of the teams to double them, or add one or two more to a plough; and have ploughed with as many as five; but this has rarely occurred—only once in eleven years. It is a great fault with Virginia farmers generally, that they keep too little team. Their work is frequently badly executed, and it results from this false economy. If I were to pursue the three-field rotation, (and which I certainly never shall) I should unquestionably keep and consider this number of horses (or rather mules) necessary. It will be recollected that I work but few oxen—so few as scarcely to be taken into consideration. Having more corn land to put in wheat, and more in corn, I should consider it not more than sufficient at those particular seasons; for it is the corn land with me that is so difficult to seed. The land is most always grassy, and of a wet season it is frequently almost impossible to plough on account of this impediment. This fall I seeded 100 acres of fallow in seven days, and was nearly four weeks seeding 68 acres of corn land. After the fallow is finished, by the last of September, it rarely requires more than harrowing in. The corn land has to have the corn removed, and to be ploughed, harrowed, sowed, and then harrowed again, at the most pressing season; for at this crisis, there must be no time lost, or the season has passed. Your corn land for wheat should be better drained, being more liable to suffer from water, not having the vegetable matter in it which the clover fallow has. It has to lie out longer, and if not drained with care, your clover may be killed from wet in a hard winter. You know, that in a farm of 400 acres, there is only 33⅓ acres of land in cultivation under the three-field course more than you would cultivate under the four-field course, and this is in the fallow for wheat, and which I have before said is done when the teams would have nothing else to do were they not so employed. There will be too, an additional 33⅓ acres in corn under the three-field course, and about which you are engaged in some way, the whole year. Now, I believe it is universally admitted, that all land intended for corn (perhaps it would be better to say all stiff soils) should be turned up as early in the winter as possible, for reasons which it would be superfluous here to mention. How rarely do we see it done. And why? Because we have not had time, having so much of it to do. I should say, as our winters are so variable and uncertain, that this would be a season of unusual pressure: more, or as much so as the seeding season—for when the weather opens, every exertion has to be made to get through in due time. We are enabled the better to get through it in the proper time, because we have less of it to do. I should remark, that as the wheat crop will be much less, and consequently under the three-field course will take a shorter time to thrash and deliver, the teams would be kept at this heavy expense the longer. The time for seeding wheat being short and limited, that system should be pursued by which we can get in the most in this given time, and at the least expense. I would ask why it is that those who pursue the three-field rotation do not finish seeding before those who fallow? Not in consequence of the excess of team; assuredly not: but because we have had six or eight weeks to prepare one-half of our whole surface, while on the other hand you are doing nothing towards it. It is put in, in a few days, before you are scarcely ready to commence, or at least the fallow land can be sowed, while you are seeding the excess of corn land. There is only one-ninth more land in cultivation annually under the four than the three-field course, and this ninth is the fallow, which as I have repeated before, is done when we should be unemployed with our teams, and we should have two-ninths more in wheat. Now let me inquire, which would be the greater press of the two, to prepare and seed two-ninths in ten or twelve weeks, or to prepare and seed one-ninth in four weeks. Again, by way of farther illustration, suppose we had but one team, say two or three horses; which would be the most easily accomplished, to prepare and seed with the same team and hands two-ninths in ten or twelve weeks, (which time you would have, say until the last of October,) or to seed one-ninth in four weeks, having the corn to remove? You could not commence ploughing for the latter, before the former would be already prepared, and would require but harrowing in, which may be done in a few days. In the other case, if the month of October should be a very wet one, you would have but little or no wheat seeded. One may be accomplished, and the other might be impossible. This may be thought an extreme case, but it matters not, as it goes to show the principle, and in the same ratio with the entire crop, will the fallow be sown. Finally, if I were to choose between putting 133⅓ acres of land in wheat and cultivating 133⅓ in corn, and putting 200 acres in wheat, one-half fallow, and cultivating 100 acres in corn, with the same team and hands, I should unhesitatingly choose the latter, independent of its greater reward, as I shall presently show.

As W. B. H. is such an advocate for a substitution of horse-power for manual labor in some other respects, I am surprised he should be so unfriendly to the fallow system, which is accomplished almost entirely by their agency. A farm can be improved and profitably managed, with a good team and few hands, but it cannot be with a good force of hands, and an indifferent team. The expense of the one will be small compared with the other, taking into consideration the first cost, &c. I shall ever bear in mind the opinion once expressed to me upon this subject, of a good practical and strictly economical farmer, who had accumulated quite a large fortune by tilling a poor soil, the late Major James Dillard of Sussex county. He wondered that farmers generally, and particularly on the wheat estates on James River, did not keep more team than they did. He was once of the impression, that more than enough merely to till the soil, and that very imperfectly, were eating up their owners; but by experience had found out his error, and then thought a double team economy. He had substituted mules for oxen almost entirely. He believed oxen kept to perform

much hard work, would cost as much as mules—being obliged to be fed with grain, &c., and then not capable of performing one-third the labor. His mode of supporting this extra team, was in the following way. During the winter they were penned in the usual way that we do our stock, except having a more complete shelter to protect them from the weather. These pens were kept well littered with corn stalks, &c. which he considered as good food as they required—and he gave them rarely any grain. After the grass put out they were of no more trouble or expense, except when used. At particular seasons when the services of the whole were required, you could have your work done speedily and effectually. I concur in the opinion of this worthy gentleman, and do believe if we were to keep a double team of mules, and abandon almost the use of oxen, (for from the peculiarities of our situation and climate, particularly in the tide-water section of Virginia, they are comparatively of but little value) we should find it greatly to our advantage. What few I have, eat more grain during winter, than my mules, and cannot do one-third the work—mules are hardier and more long lived animals, and fed in this way, would make more manure, and that better.

The next objection which W. B. H. says is of a formidable character, is that "the more valuable crop, corn, is sacrificed in part, to the crop of wheat, which is less safe."

As I have before said, gentlemen who have raised objections to this system, have furnished no written data by which to be governed. I shall therefore allow in my comparisons the most liberal crops that I have ever heard of, any year, under the three-field rotation, and compare them with my own under the four-field; and in this comparison shall be governed, also, in what I believe my own estate would make under the same system, and under the most favorable circumstances. In getting an average price of the crops of both wheat and corn for the last five years, I have been furnished with such as I may quote, by reference to the journal of a friend, who has regularly sold both crops. It will be unnecessary to state the prices each year, but take an average for the last five years—

The average price of wheat for that time has been, per bushel,	$1 09½ cts.
The average price of corn for that time has been, per barrel,	2 93½

He says in a note, "the above prices are what I have sold at each year; but I ought to remark, that the prices of wheat are rather under the highest prices that wheat has sold for some years, as I did not always get the highest price for wheat; but the prices of corn are a little over the prices generally got in each year; as I have generally got a little over the market price for corn, as my corn is white and very nicely cleaned, and has a very high character in Petersburg."

When upon a former occasion it was stated by me, that one-fourth of a farm under the four-field and fallow system would produce more corn than one-third under the three-field, it was supposing the farm cultivated under the old plan, which I believe is still kept up, of grazing the one-third bare. For if a farm under that course has ever received the generous assistance of a standing pasture, I have certainly never seen or heard of it. Persons who pursue this course, are too tenacious of their soil for tillage, to appropriate it to so wasteful a purpose, as they think. And I am led to such a conclusion, also, from the knowledge and belief, that under the four-field course, the crops would increase from the increase of fertility; and under the other, would diminish for the want of this improvement—and still think one-fourth of a farm, in a series of years, under the four-field system, will produce more corn, than under the old three-field course. I may revert to this again.

I will now undertake to show to the satisfaction, I hope, of all impartial persons, that the corn crop is not so valuable a one as that of wheat. To effect this object, I shall give my average crops for the last five years, (or rather will give four crops) and will omit the crop of wheat of 1833, as I do not believe any one in this section of Virginia would admit that as any thing like an average crop, it having been destroyed by incessant falls of rain for nearly six weeks, and that when the wheat was nearly matured, an event never known with us before. My crop of that year, however, shall be taken into the calculation in its proper place, and allow the difference it would make in comparing the relative value of the two crops for the whole term of five years. I will first take the crops of wheat for the years 1830, 1, 2, and 4, and the crops of corn for four years also. I will remark, that my crop of corn of 1833 was 616 barrels. I was advised to stack the corn on the land while sowing wheat, that I might get through the quicker in seeding; it was the first time I had ever done so, and do believe I lost 100 barrels by the birds and wet weather; the land was scarcely ever in a condition to drive over without destroying much wheat, and on our narrow eleven feet beds, the carts, &c., filled up our water furrows so much, that I was until the spring before I succeeded in housing it. Corn should always be removed from the land intended for wheat, if possible. Our winters are so wet, that there will be much loss from depredations: and it is a crop which easily decays from exposure to the weather too long.

My average crops of wheat for the above mentioned four years have been 3114 bushels, which at the average price as above quoted is,	$3409 83
My average crops of corn for four years, viz. 1830, 1, 2, and 3, are 435 barrels, which at the average price above quoted is, - - -	1275 28
Gross amount under four-field course, if the entire crops had been sold,	$4685 11
Now 133⅓ acres land in wheat under the three-field course, allowing an average of 12 bushels per acre, is 1600 bushels, which at the average price for wheat as above is, -	$1752 00
133⅓ acres in corn, allowing an average of 5 barrels per acre, is 666 barrels, which at the average price as above is, - - - - -	1954 71
	$3706 71
Balance in favor of four-field system,	$978 40

Cr.—difference in the "heavy item of expense" in seed wheat, - -	62 88
Dr.—difference in seed corn and clover seed, - - - - - -	15 52
	$900 00

Now here is a difference of $900 upon a small farm in favor of the four-field and fallow system, after allowing an average of 12 bushels of wheat per acre, and 5 barrels of corn, for the above years, which I trust will be considered a liberal one. Including my crop of wheat of 1833, which was 2300 bushels, (and which God grant I could take into the calculation as an average crop, for it promised to be at that advanced season, May and June, to be much the best I ever had,) it would make the balance in favor of the four-field $722. I have given the above average of 12 bushels of wheat, per acre, and 5 barrels of corn, as they are the best I have ever heard of any year, under the three-field course, and hope it will elicit from others, a more correct statement of their average for the years above quoted. Under my present impression, I do not think their crops have averaged 10 bushels of wheat, or 4 barrels of corn, where lime has not been used very extensively, if even then. Several good farms on James River *(possessed of the rich mellow soils, and the great natural fertility of mine,)* have not averaged 8 bushels of wheat, or 3½ barrels of corn under the three-field course, as I have been told by their owners. Why is this so? Most assuredly in consequence of a defective system.

Again, let us continue our comparisons: my fallow for wheat has averaged 21⅓ bushels per acre, and my corn land in wheat within a fraction of 10 bushels, viz. $\frac{981}{1000}$. You are told that corn will produce more money in a series of years, from the same land, than wheat—now let us see:

100 acres of fallow for 4 years has produced 2133 bushels, which at $1 09½ cts. is, - - - - -	$2335 63
100 acres in corn for 4 years, an average of 5 barrels, is 500 barrels at $2 93½ cts. is, - - - - -	1467 50
Amount in favor of fallow for wheat,	$868 13
An average of the two crops from fallow and corn land for wheat, is rather over 15½ bushels per acre, 100 acres at this is 1557 bushels, at average price is, - - - - -	$1704 91
The crop of corn from 100 acres would be, - - - - -	1467 50
	$237 41

So that an average of the two crops of wheat from the fallow and corn land, will amount to more than the product of 100 acres from corn as a first crop. Again, let us see the difference between fallow first for wheat, and succeeded by corn; and corn the first crop, and succeeded by wheat.

Wheat from fallow field of 100 acres, an average of 2133 bushels at $1 09½ is, - - - - -	$2335 63
Corn after wheat 435, on an average at $2 93½ is, - - - -	1276 72
Amount from fallow for wheat, and corn after it, - - - - -	$3612 35
Corn as a first crop, 5 barrels per acre at $2 93½ is, - - - - -	1467 50
Wheat after corn at 12 bushels per acre is, - - - - -	1314 00
	$2781 50
Balance in favor of fallow for wheat,	$830 85

But before concluding these comparisons, I will state a fact which will be somewhat more at home to W. B. H. The year I purchased this estate, (1829) my best field was put in corn after clover, by my worthy predecessor, (whose capacity to manage any crop, I am sure W. B. H. will acknowledge, and allow me to add my testimony in his behalf.) This field of 100 acres produced, under his directions, 7 or 8 barrels of corn to the acre, (I do not know the precise amount, but will say eight barrels:) now, from the price of corn that year, (1830) this 800 barrels would not have brought $1500. But we will allow the average as I have before done, and the amount that the 800 barrels would have brought, would be $2348. I put the very same land in wheat after clover in the fall of 1831, and the crop was 3000 bushels, which brought me £1000—more than double, if the crops had been sold as they were made; but we will carry out the average prices—

The product of this 100 acres from fallow, 3000 bushels at $1 09½ is,	$3285 00
The product of the same land in corn, 800 barrels at $2 93½ is, - -	2348 00
	$937 00

Here is a difference in favor of the wheat crop of $937, from the very same land, and both after clover. I hope that this statement alone will satisfy my friend that he is mistaken in supposing that the same land will produce more money from corn than from wheat, where an equal surface is devoted to each crop.

I am very sure that any of our James River lands (of course I do not mean our light sandy soils,) that will produce 4 barrels of corn to the acre, will also produce 20 bushels of wheat upon a good clover fallow, if well prepared and seeded. And do believe also, that land which will produce 8 barrels of corn to the acre, will produce from 25 to 30 bushels of wheat, after a good fallow. But to attain this, the earth must be well ploughed during the months of August and September, (nor should you stop your ploughs because the land is a little hard,) well harrowed, and then well sown and drained, and I will warrant the result. The fallow for wheat has paid me so much more than the corn land, that I am almost discouraged from seeding the latter. This fall, being stopped by heavy rains, I determined to seed a portion in oats, (one-fourth.) If it should result favorably, and the clover should succeed as well after it, I shall hereafter leave one-fourth to one-half for that crop, of my corn land, otherwise intended for wheat.

There are other considerations too, which should be borne in mind, in comparing the relative value of these two crops—one is, that the corn crop will not answer as a sale crop for persons living at a

distance from navigation—as it will not afford transportation by land to any distance—which no doubt all calculating persons will take into consideration. Another very important consideration is, that the fallow system gives you so much more straw from which to make manure.

I do in my conscience believe, that a farm, say one of 400 acres, (as that is more familiar to me) will pay from $1000 to $1500 more under the four-field and fallow system, clear, than the same farm managed under the three-field course, in a series of years. The least I can say is, that the advantages in favor of the four-field, will be sufficient to defray all the necessary expenses attendant on the cultivation and management of such a farm.

W. B. H. next supposes the corn crop not sufficient to employ the hands advantageously, except in seeding and securing the crop of wheat. In answer to this I must say, that my belief is, that under this system, with a good team, less manual labor is required than under the three-field course, in preparing and seeding a crop of wheat. Having more corn land, which I hope I have before shown, required more of this sort of labor. But in securing the crop, I will acknowledge it will require a greater press; and who can object to this press, when he is so well paid for it? All this extra time we are supposed to be idle, or at least no profitable farm labor, with teams, can be imagined. I hope your correspondent will not contend that my force (which has been given) is more than sufficient to cultivate a farm of its extent, under any system, where improvement is aimed at. I am as much, or more pressed at this season of the year in preparing for corn, and getting out my manure—for he must recollect how much more the system gives in this article for employment. Upon due reflection, one must think upon the whole, the labor much more equally distributed under this than the three-field course. I have certainly never yet seen the day I had not as much to do as I could do. It has on the contrary been a matter of astonishment with me, what employment is given to the hands under the three-field course at certain seasons, (for as far as I have observed, they keep as large, or a larger force of hands)—particularly those who cultivate their corn crop almost entirely with horse-power. Their crops of wheat are light and small in harvesting and thrashing, and nothing like the quantity of land manured, compared with ours. I like to be pressed, if by this pressure I can receive a sufficient compensation for it. A farmer who always has spare, or sufficient time to accomplish any work, is sure to become careless and inattentive about it; and from this inattention, his purse and farm both become sufferers. I beg not to be understood as desiring this press, that I may impose an undue degree of hardship on the slaves; by no means—but enough to keep one always on the alert, and his wits exerted, to get through in due season.

I must beg leave to differ from W. B. H. in supposing that no corn will be sold from the four-field and fallow system. An estate well managed under that system, should sell corn enough nearly, or quite, to defray the expenses of the estate: for I have no question, but that from its improvement, it will yield from 5 to 8 barrels of corn to the acre. I am supported in this conclusion also, by the fact that my brother the last year averaged 7 barrels of corn per acre, on one-fourth of the Woods Farm in Curle's Neck, an estate which has been regularly under this system for 19 years. I have never made less than enough to support the estates, except the first year; (and this deficiency I have upon a former occasion accounted for) and might have sold corn each succeeding year, had I not had so large and expensive family. And with me it is a most extravagant and wasteful article. If I had practised the same economy in the management of my corn crop that some do, I might have been quite a considerable seller in that article. Many sell more than they should, for their teams are often not in a condition to perform their required labor. As my estate has improved greatly, I shall calculate hereafter on selling enough to pay all the necessary expenses of the estate. I should remark that my corn crop of the last year has not all been shucked out, being told that it would keep much better in this state. I therefore do not know the precise quantity, but this I will say, that, after encountering the severest drought I have ever known, it will make considerably more than the same field did when previously in corn. Dr. John Minge was an eye witness to the fact.

I greatly prefer, too, when we realize money from a farm, it should be received in as large sums as possible, to its being much divided. For my fingers, unfortunately, are too slippery for it to stick, when it comes in driblets, but, when derived in a large sum it is more apt to be appropriated to a good purpose: particularly, would I prefer it, when we can get so much more of it from the wheat crop under the four-field and fallow system.

I should mention also that I have sold corn at $1 50 and $1 75 per barrel. I would ask, how would a poor farmer feel, and in what situation would he be placed, who relied upon his corn crop, as his staple crop, for a support, those years? Of the two crops, wheat and corn, the latter is unquestionably the most uncertain and variable, both in product and price.

W. B. H. next objects to the system, because he says the succession of three white, or grain crops, is opposed to the universal practice and experience of all good cultivators of the soil, both to the north, and in Great Britain. To this I must say, that I have never had the time, and if I had, have never devoted it to reading English works upon agriculture, and therefore can say nought as to their practices. This I do know however, that our climate and soils must differ materially from theirs; and therefore the same rotation of crops may not agree. And I well know that two small grain crops, that is, wheat after wheat, or oats after oats, will not succeed well; because I suppose, the previous one has exhausted most of the ingredients contained in the earth, peculiarly suited to the second crop, and in which it would most delight. But it must be recollected that one-third to one-half of the surface will have had a manuring, besides the remaining effects of the clover, and the entire decomposition of the stubble of the first crop of wheat; and the corn crop, a hoe and summer crop, and entirely a different one in its cultivation intervening, prepares the earth with a pabulum the better suited to the second crop of wheat. It is true that the second crop of

wheat is not so large a one as the first—and it would be expecting too much for it to be so, after two other crops previously—but even then, I believe it is a better one than is generally made under the old system of three-fields; and if the average is taken of the two crops it is indisputably so.

W. B. H. next says, "cannot a standing pasture be combined with the three-field course," &c. &c. I have before said that such an occurrence had never yet met my observation. Those who are impressed with the necessity of it are too reluctant to commence it, by surrendering a portion of their arable surface, (which, however, is not always necessary.) And many with whom I have conversed, are impressed with the necessity of a change of system, but cannot bring their minds to the conclusion of surrendering a larger, for a smaller portion of land for corn: for say they, "one-third of my farm, now scarcely furnishes me with corn—how then can I possibly make bread on only a fourth?" "But," it might be answered, "are you not now on the eve of starvation under your present system? Are your lands improving; or do you realize any thing from them?" "No, I sell enough corn barely to pay my blacksmith's account, &c. and of wheat, if it should be a good season, to defray my other expenses, with great economy." "But how are your children to be benefited by this? How are you enabled even to give them a liberal education, independent of furnishing them with a start in the world?—Your parents left but yourself, and you are barely enabled to live with your means, what must become of your six children?" "Why, my father and my grandfather, &c. pursued this same system, and made money with which to buy this same estate, and raised a large family." "But your ancestors lived in better times: lands were then cheap; and they had these same lands that you are now almost starving upon in their primitive state—the rich virgin soil to work upon, and from which to make money; but they have left none of its richness for you, from which to do the same? It is now a waste, gullied and barren. And what has brought it to this condition? Has it not been this same *three-field course* that you now adhere to? Has it ever been under any other? "No." "Well, by adhering to it, can your lands be improved, or your condition bettered?" "No—but before I can diminish my cultivation for corn, (which now barely supports me) I must remove to the west." Yes, sir, this is a true state of things. And this very three-field course has been the principal cause of the great tide of emigration to the west, and until that is abandoned, it must continue to flow.

W. B. H. says again—"is it not better to manure one-third with clover, under the three-field course, than one-fourth under the four-field?" Without this standing pasture I must say, there will be but little benefit derived from the clover under the three-field course. But even admitting it was not grazed off, as is customary, I question very much whether the benefits are not greater towards improvement, when turned under in the months of August and September, when it is in its greatest degree of perfection, than when ploughed under in the winter or spring, when there is scarcely a vestige of it to be seen on the land. A good clover lay for wheat may, much of it, be seen the next winter, when the same land is turned up for corn, in a perfectly decomposed state. And this fact goes a great way too in supporting the belief that one-fourth will make more corn than one-third. I, have frequently when the clover has been a very heavy crop, taken up handfuls at a time remaining in this rotted state. Under the foregoing impressions, I doubt very much whether an estate would not improve the faster, when under any system the clover remained but one year. But there remains not a doubt on my mind, when, in addition to the clover, is added the greater quantity of manure.

I would remind W. B. H. and Mr. John Wickham, that it is not always the richer soil that is most successful in clover. On the contrary, we frequently see rich portions of a field fail, and poor hill-sides succeed. The soil should be freshened or altered in some way, either by manures, or by cultivation. Land which has been heavily dosed with clover, will most generally fail, if seeded in it again, before it has gone through some preparatory crop, and will become what is termed clover sick. Poor fresh land, we frequently see succeed better, and bring better clover than much richer land that has before borne it. I think our four-field system peculiarly adapted to the clover husbandry. The land from the previous cultivation, seems to be in the very best state to receive it again. I am confirmed in this fact by never having failed in my life, and if W. B. H. will observe, farms which are under this system, seem always to have better clover fields.

I hope, sir, I have said enough to condemn the three-field system as a rotation suited to us. I will briefly refer to W. B. H's. favorite system of five-fields. There appears to me to be a want of consistency in his preference for it, that I cannot exactly understand. Perhaps it is for my want of a better knowledge of it; and if wrong, I hope to be corrected. My idea of it is this: that one-fifth is in corn, two-fifths in wheat, one-fifth in pasturage, and the remaining one-fifth in clover. To be more particular, and that I may be the better understood, I will convey my idea of it by the following diagram.

	1st field.	2nd field.	3rd field.	4th field.	5th field.
1st year	Corn.	Wheat after clover	Wheat after corn.	Pasture.	Clover.
2nd.	Wheat after corn.	Pasture.	Clover.	Corn.	Wheat after clover
3rd.	Clover.	Corn.	Wheat after clover	Wheat after corn.	Pasture.
4th.	Wheat after clover	Wheat after corn.	Pasture.	Clover.	Corn.
5th.	Pasture.	Clover.	Corn.	Wheat after clover	Wheat after corn.

I have been thus particular that I may be put right, if I have taken a wrong view of the rotation. Now, W. B. H. objects to the four-field rotation, because only one-fourth is apportioned for his favorite and more valuable crop, corn. How he can reconcile this system to himself, when one-fifth only comes in that crop, (and that not after clover) I cannot imagine: for the consequence must be that his more profitable crop, corn, will be greatly lessened in quantity. Again he objects to the four-field system, because, says he, "is it not better to improve in this way one-third than one-fourth of the same farm" with clover? Under this five-field course there will only be one-fifth improved with clover. And I would ask if it is not better to improve with clover one-fourth than one-fifth? No one can doubt but that the field allotted to be grazed will be cropped harder than any. My impression is that it will be the greatest sufferer of the five fields. The idea of appropriating one-fifth annually of arable surface as a pasture, will never do. The clover if sown on the pasture field will soon be destroyed by the stock, for you must commence on it, grazing before it can have gotten much start in the spring in growing; and it is easily destroyed at that season, and if not seeded in clover lands which are regularly cultivated, throw up but little grass from which to nourish stock. The advantage of a standing pasture is, that it forms a sod of blue or other grasses, which is not killed, but increased by being trod by stock; but where you cultivate lands regularly, this sod is destroyed, and therefore your fields will be left bare and exposed the whole summer to the hoof and the sun. But there are other objections which are of too "formidable" a character to be overlooked, and which I should imagine would be serious ones with him, viz. that the field grazed would come in corn the succeeding year, and consequently that crop greatly shortened for the want of the clover. There would not only be three grain crops in succession, but what would be much worse, there would be four, or what might be considered equivalent to it—and they may be counted in this way. 1st. Wheat. 2nd. Grazing—3rd. Corn—and 4th. Wheat. So that the two latter crops will not have received any benefits from the clover whatever: on the contrary will be preceded by a bare crop, (for I know not what else to call it.) This must be the case; for the usual number of stock of all kinds kept on an estate, will leave not a vestige of vegetable matter on one-fifth of a farm, when it is kept under regular tillage, and only remains out one year. It is true you will have the stick weed, &c., which we had better be without. Again; under this system you would have less materials from which to make manure. Also, you will have more fencing to keep up; as your wheat fields must be divided from each other occasionally. The fact stated by W. B. H of his having to abandon it in consequence of its becoming too foul, is alone sufficient to condemn it with me. I am opposed to these odd rotations—for to me they appear odd, indeed. If I were to cultivate lands which would not bear the four-field and fallow system, (and I think there is but little with us that will not) I should adopt the system of Arator—and which is the system I spoke of in allusion to Mr. Lewis. Or, I should adopt the six-field until my land was in a condition to pursue the more rigid and profitable one of four-field, and fallow: but none without a standing pasture. If our lands lie out too long (which is an objection to all fallow systems with us, except the four-field,) they become too foul with blue grass, &c. &c. Once in four years in a hoe crop is almost indispensable, and therefore the five or six-field systems will not answer. If W. B. H. imagines that I recommended the four-field and fallow system for "universal adoption," he is certainly mistaken. I did so for our James River lands, and now take pleasure not only in recommending it to James River farmers, but for all farms which can be made to produce clover—as it combines the two desiderata of profit and improvement in an eminent degree, above all others.

In my allusion to the four-field and fallow system having originated with Mr. James M. Selden in Curle's Neck, on James River, I was not aware of its having been practised by any one but himself, prior to the time referred to, but have since learnt, from a conversation with him, that Mr. Harding practised it about the same time, which he was not then aware of at the time he commenced it. Nor had he ever heard of its being practised by any one else, until Major Heth brought Mr. Harding down to Curle's with him, for the purpose of obtaining his advice with regard to its management, being then thought one of the best farmers in the state. It was at this time Mr. J. M. Selden first learnt that Mr. Harding was pursuing the same system with himself. And Mr. H. advised it as the best system for Major H. at Curle's. He (Mr. Harding) told Mr. J. M. S. that he was practising it on an estate which he had purchased, and which was in a very impoverished condition, but under this system, expected in a short time to resuscitate it. I believe there is not a question about his having done so; whether he continued it to his last, or not, I cannot say—but ever since I can recollect, or took any interest in agriculture, Mr. Harding has been held up as a model, and as being the very best farmer in the state. Believe me, sir, when I say that I did not intend to deprive Mr. Harding of one iota of his reputation as the father of this system. No, none—on the contrary let me add to it, by calling it *Harding's system;* and hope it will be handed down to posterity as immortalizing his name.

But before dismissing this subject, let me say a word in support and justification of this system, as practised by Mr. Harding at Dover. Mr. Harding did not pursue the system there, with the intention of improvement, having had it on lease; and I will state a few facts, as I am credibly informed, which should go to prove it. He had no standing pasture; used none, or but little plaster; sowed clover not with the view of improvement, but for grazing—had a smaller force than was necessary for the cultivation of the estate—kept a large head of cattle, and from them derived a great portion of his profits. For I am told he kept fifty or sixty milch cows, and from butter alone sold from $1000 to $1500 annually. Now, is it expected, or could it be expected, that an estate would improve under these circumstances? I wonder W. B. H. should not have inquired more particularly into the mode of its cultivation, and the assistance given to it, before pronouncing condemnation upon the system. I have never yet seen an estate under this system that has not improved, where it has been fully carried out; and

all certainly cannot be in the hands of first rate managers. But I will state a fact, and W. B. H. can easily get the same information from fountain head—that Col. Allen's estate in Curle's Neck, under the management of my brother Miles, has the last year cleared net proceeds between seven and eight per cent. upon $100,000—which is more than the first cost, and rather more than its appraisement, within the last few years—and this seven or eight thousand dollars net, has been done with forty mules, and fifty hands of all sorts, and no oxen, or scarcely any—for I think he has but eight on the whole estate. This is from an estate that has been under this, and much harder systems for the last eighteen or twenty years, but for the last six or seven years under the four-field and fallow regularly. It would be well to mention too, that from its particular situation, it is a very expensive estate, as all the pork, &c. for its use has to be purchased, which should never be done on any, if possible. The gross amount of sales from wheat and corn, were between twelve and thirteen thousand dollars. Let me inform W. B. H. too, that this estate has regularly sold from $1000 to $3000 worth of corn a year. These facts do not show that this is an "exhausting course;" but on the contrary, a very improving one. These results too are without one cent being expended in lime or marl. I could relate other instances of its great benefits, but it would be superfluous. I am already weary of reciting them, and am sure others must be of hearing them. I shall therefore take my farewell of the subject, and let my efforts, as I hope in a good cause, go for what they are worth.

JOHN A. SELDEN.

From the Rail Road Journal.

EXTRAORDINARY PERFORMANCE.

The purse of $1000 offered by Mr. J. C. Stevens to any one who should succeed in going ten miles, on foot, within the hour, was yesterday gained, *eleven seconds* within the time, over the Union Course, Long Island, by a Connecticut man, named Henry Stannard, a farmer of Kilingworth. Two others, as we learn from the Courier, went the ten miles, one a Prussian, named George W. Glauer, who did the distance in 60½ minutes—and the other an Irishman named Mahoney, who did it in 61¾ minutes.

There were at starting nine competitors, whose names and deeds are thus set forth in the Courier:

Miles.

	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
Stannard,	3	4	3	3	3	2	2	1	1	1
Glauer,	2	2	1	1	2	3	3	3	2	2
Mahoney,	1	1	5	5	4	4	4	4	2	2
Downes,	5	3	2	2	1	1	1	2	gave in.	
McGargy,	6	7	7	7	5	gave in.				
Wall,	4	5	4	4	gave in.					
Sutton,	8	8	6	6	gave in.					
Mallaro,	9	9	8	8	fell and gave in.					
Vermillye,	7	6	gave in.							

The winner did not show much fatigue, and was seen soon after riding about the Course.

The other two who went the ten miles received $200 each.

The Courier gives this statement of the time in which each mile was done by the winner:

	Min.	Sec.
1st mile,	5	36
2d "	5	45
3d "	5	58
4th "	6	29
5th "	6	2
6th "	6	3
7th "	6	1
8th "	6	3
9th "	5	57
10th "	5	54
	59	48

It is said that the course is six feet over a mile, making sixty feet more than the ten miles, in the distance run.

Now 60 feet being the 88th part of a mile, it would allow (taking the time of the last mile) four seconds, which is to be deducted, making the distance therefore in fifty-nine minutes and forty-four seconds.

The speed of the runners will be best estimated perhaps by stating, that Stannard was accompanied the whole distance by Mr. Stevens on horseback, and that the horse was all the time in a fast canter.

From the Genesee Farmer.

BEET ROOT SUGAR.

A committee of the French Chambers have made recently a long and elaborate report, on the state of their tariff, and the effect of high duties, in the course of which, the article of imported sugars necessarily led to an examination of the quantity of that staple manufactured in France.

The report "enters at great length into the state of the manufacture of beet root sugar, and brings to light a variety of circumstances respecting that description of sugar hitherto but little known even in France. It appears that this sugar, not being liable to duties in any way proportioned with those levied on the colonial article, has established a competition in the home market which is highly injurious to the importer of and the dealer in the latter. The number of manufactories of beet root sugar in various parts of France has been increasing rapidly of late years. Land destined for the cultivation of beet root is let at a higher rent than for any other production. About 18,000,000 kilogrammes, equal to 36,000,000 lbs. or 18,000 tons a year of the article are manufactured, according to the latest estimates, and the profits it yields to the manufacturer are enormous. The committee recommend that beet root sugar should be taxed in such a way as to be of advantage to the revenue, without being injurious to the interests of the colonial planter and the refiner of colonial sugar."

From Radcliff's Report on the Agriculture of Flanders.

FEEDING HORSES IN FLANDERS.

Eight horses perform the entire work of the 200 acres, and are in the highest possible condition. They are of the most compact kind of Flemish horse, and do not exceed 15½ hands, in height; chiefly roan and chestnut in color. As the banks of the river supply good hay, in this district they are indulged with that species of food, which is not the case in other parts of Flanders; but they are also fed upon straw, chiefly of rye, and upon oats with chopped straw in every feed, and *after* every feed, a bucket of water, richly whitened with rye, or oat meal. A vessel of this composition is in every stable, nor are the horses suffered to have any other drink. The quantum of food in the 24 hours for each horse, in the winter, is 15 lbs. of hay, 10 lbs. sweet straw, and 8 lbs. of oats; in summer, clover is substituted for hay; the other feeding remains the same; and the white water is never omitted: on this they place a chief reliance. The allowance of oats is but moderate, and yet the horses are in superior condition; the chopped straw contributes much to this, in converting, by the mastication necessary, every grain of corn to nutriment. The use of it is so universally approved throughout Flanders, that in every town it is sold by retail, and if generally adopted with us, it could not fail to improve the condition of the working horses, and lessen the expense of their provender.

In Flanders, a farmer will work fifty acres with two horses; and by the regularity of his care and keep, will preserve their condition. In Ireland, the great wheat farmer of Fingal, upon a similar extent, will keep four times the number, fed more expensively, but not so judiciously, always overworked and always poor. Some of these farmers, upon 100 acres, keep sixteen horses in their employ, and there have been instances of three-fourths of that number being lost within the year by hardship and disease. By these means the profits of a farm are consumed without benefit to the farmer; and what would reasonably support and enrich him, is squandered upon supernumerary horses. This special circumstance, not the high rent, keeps the tenant in indigence and difficulty. If landlords interferred to procure for their tenantry a good description of working horse, and encouraged them to use him properly, and feed him well, it would tend more to their advantage than any abatements they can give. Upon the farm of Vollandre, the management was in all points to be approved: economy prevailed in every respect, except in the application of manure; the occupier was in comfort and affluence, and yet his rent was near 40s. by the plantation acre, and his taxes triple those of the Irish farmer. The difference is to be found in established system, skilful management, and unceasing industry.

GAS USED AS FUEL FOR COOKING.

Extract from a letter of Mr. John Barlow, one of the most experienced and distinguished engineers of London, dated on the 27th February last.

"There is one source of revenue to a coal gas company, fast coming into practical effect here, which promises to be of great importance, namely cooking by gas; I know one family who have used no other fuel for cooking for the last two years, and another who for several years have never lighted any other fire in their house, for any purpose whatever, than gas, during the 3 or 4 hot months, and they both say that it is cheaper, more convenient, cleanlier and the cooking better. Hundreds, and probably thousands of families will, in this country, be supplied with gas for cooking during the ensuing summer. They now roast, bake and boil by gas. The heat is always ready when wanted, and is extinguished when it is no longer required: no dust, no preparation, nor any cleaning up afterwards; the cook can leave a joint of meat either roasting or boiling, and never look at it again till the clock informs her it is time to take it up; I know a family who regularly put their meat down, and all go to church on Sunday, locking the house up, and leaving a capital dinner to the care of the gas. I dwell on this subject a little, because in my view, it is very important, and it behooves directors and shareholders to give it every encouragement.

LIVERPOOL AND MANCHESTER RAILWAY.

The editors of the Baltimore American have been favored with a report of the directors of this work, and present their readers with a brief synopsis, from which it appears that during the half year ending on the 31st December, the receipts were,

Coaching department,		£60,292	7	4
Merchandize	do.	41,197	18	6
Coal	do.	3,408	16	4
		104,899	2	2
The expenses of all kinds, during the same period, were		64,552	15	7
Net profit for six months,		£40,346	6	7

The directors in former reports have alluded to the course which they had considered it expedient to adopt of substituting heavier and stronger rails in place of those which from time to time had been bent or broken; owing to the service to which they were subjected, from the speed and weight of the engines, being far more severe than was originally contemplated. From experience of the decided superiority of these parts of the way which have already been laid with the stronger rails, the directors feel the propriety of proceeding to re-lay with stronger rails such portions of the line as have from time to time to be taken up for the purposes of substituting stone blocks for the original wooden sleepers, and they doubt not, in so doing, they shall obtain the concurrence of the proprietors.

By the foregoing statement of accounts it appears that there is a net disposable profit for the half year of	£40,346	6	7
Which added to the surplus from last half year	155	11	0
Amounts to	£40,501	17	7

Of this sum the directors recommend that a

dividend be now made to the proprietors of £4 10s. 0d. per £100 share amounting to £35,850. That £3000 be appropriated to the relaying of the way with stronger rails and that the remaining sum of £1651 17s. 7d. be carried as general balance to the next half year's account.

Extracts from the last edition of the "Complete Grazier."

ON THE ECONOMY AND MANAGEMENT OF THE DAIRY.

Of the making and preservation of Cheese.

The goodness of cheese, as well as of butter, depends much on the quality of the milk; though the season, and particular process adopted in making it, also, have a very considerable influence upon it in this respect—more perhaps than the material of which it is prepared. We shall, therefore, briefly notice these circumstances; and, as different modes of making cheese are practised in different counties or places, we shall then concisely state those which are more particularly deserving of notice.

The best *season* for this purpose is from the commencement of May till the close of September; or, under favorable circumstances, till the middle of October; during which interval cows are, or can in general, be pastured. In many large dairies, indeed, cheese is often manufactured all the year round; but the winter cheeses are much inferior in quality to those made during the summer months; though there is no doubt but that good cheese may be made throughout the year, provided the cows be well fed in the winter. It is also worthy of attention, that milk abounds most in caseous matter during the spring, and with the butyraceous in summer and autumn.

After milk has been exposed for a certain time to the air—generally two or three days, according to the season—it becomes sour and coagulates. The curd which is thus formed may then be either made into butter, by the process of churning, as already detailed in the preceding chapter, or, being merely broken, the serum, or whey, separates from it, and, by means of pressure, it becomes cheese. The curd thus formed, being composed of both the caseous and the butyraceous matter combined, constitutes the richest, or what is commonly termed *full-milk cheese:* that produced by the curd which remains after the cream has been taken off, is necessarily more poor, in consequence of the abstraction of the butyraceous substance, and is termed *skim-milk cheese:* but there is no material difference in the mode of making either. It having, however, been found, that cheese made from sour milk is hard and ill-flavored, means have been devised to curdle it while sweet. With this view various substances have been employed, but the most effectual hitherto discovered, and consequently the most generally used, is taken from the stomach of calves—denominated *rennet;* and, as no good cheese can be made without it, great attention is necessary in preparing it for coagulating the milk. Strictly speaking, rennet is the coagulated lacteous matter, or substance, found in the stomachs or maws of calves that have been fed only with milk, though it is, in a more extensive sense, applied to the *bait*, *vell*, *maw*, or, *stomach*, as it is variously termed, which possesses the same properties; and which is now invariably used for that purpose.

Dairy women usually preserve the maw, and the curd contained in it, after salting them, and then, by steeping this bag and curd, make a rennet, to turn their milk for making cheese. But a more simple method, and which is equally good in every respect, is to throw away the curd, and, after steeping it in pickle, stretch out the maw upon a slender bow inserted into it, which will soon be very dry, and keep well for a long time. An inch or two of the maw thus dried, is steeped over night in a few spoonsful of warm water, which water serves full as well as if the curd had been preserved for turning the milk. It is said that one inch will serve for the milk of five cows. However, as the quality of the rennet is of considerable importance, in the manufacture of cheese, we shall here mention a few of the most approved methods of its preparation. That recommended by the late Mr. Marshall is as follows:—

"Take the maw of a newly killed calf, and clean it of its contents: salt the bag, and put it into an earthen jar for three or four days, till it form a pickle; then take it from the jar, and hang it up to dry, after which it is to be replaced in the jar, (the covering of which should be pierced with a few small holes to admit air,) and let it remain there for about twelve months.

When wanted for use, a handful each of the leaves of sweet-briar, dog-rose, and bramble, with three or four handfuls of salt, are to be boiled together in a gallon of water, for a quarter of an hour, when the liquid is to be strained off and allowed to cool. The maw is then to be put into that liquid, together with a lemon stuck round with cloves; and the longer it remains in it, the stronger and better will be the rennet. Half a pint or less of the liquor is sufficient to turn 50 gallons of milk."

The above is much used in Gloucestershire. In Scotland, according to Mr. Aiton, so far from throwing away the curdled milk found in the stomach of the calves, or washing away the chyle, both are carefully preserved, and are supposed to form a more powerful rennet than can be drawn from the bag alone. It is prepared thus:—

"When the stomach, or bag—usually termed the yirning—is taken from the calf's body, its contents are examined, and if any straw or other food be found among the curdled milk, such impurity is carefully removed; but all the curdled milk found in the bag is carefully preserved, and no part of the chyle is washed out. A considerable quantity of salt—at least two handfuls—is put into and outside the bag, which is then rolled up, and hung near a fire to dry: it is always allowed to hang till it is well dried, and is understood to be improved by hanging a year, or longer, before being infused.

When rennet is wanted, the yirning, with its contents, is cut small and put into a jar with a handful or two of salt; and a quantity of soft water that has been boiled, and cooled to about 65°, or of new whey taken off the curd is poured upon it. The quantity of water, or whey, to infuse the bag, is more or less according to the quality of the yirning: if it is that of a new-dropped calf, a Scots choppin, or at most three English pints, will be enough; but if the calf has been fed four or five weeks, two quarts or more may be used. The yirning of a calf four weeks old yields more rennet than that of one twice that age. When the infusion has remained in the jar from one to three days, the liquid is drawn off, and strained, after which it is bottled for use; and if a dram-glass of any ardent spirit be put into each glass, the infusion may either be used immediately, or kept as long as may be convenient."

Rennet thus made, from the maw of a well fed calf of about five weeks old, Mr. Aiton says will coagulate thirty gallons of milk; but its chief advantage consists in the quickness with which it is performed, which he asserts does not occupy more than from five to ten minutes, while in England the same operation usually requires from one to sometimes three hours, and this he attributes chiefly to the removal of the curdled milk and the washing away the chyle from the maw, and partly to the practice of hanging up the bag to dry after it has been steeped, by which the pickle, which he considers as the best part of the rennet is lost. In opposition, however, to Mr. Aiton, an ingenious writer, who has made strict inquiry into this subject, recommends the following method of preparing a rennet, which he has found to be better than any other:—

"Throw away the natural curd, which is apt to taint and give the bag a bad smell; then make an artificial curd, or rather butter, of new cream, of sufficient quantity to fill the bag. Add three new-laid eggs well beaten, one nutmeg grated fine, or any other good spice; mix them well together, with three tea-cups full of fine salt; fill the rennet bag with this substance, tie up the mouth, lay it under a strong brine for three days, turning it over daily. Then hang it up in a cool and dry place for six weeks, and it will be fit for use. When it is used, take with a spoon out of the bag a sufficient quantity of this artificial butyrous curd for the cheese you purpose to make, dissolve it in a small quantity of warm water, and then use it in the same manner as other rennet is, mixed with the milk for its coagulation."

But, whatever kind of rennet the dairy woman may choose to prepare, it should be remembered, that this animal acid is extremely apt to become rancid and putrescent, and that great care is necessary to apply a sufficient quantity of salt to preserve it in its best state; because the rank and putrid taste, occasionally found in some of our English cheeses, is owing to a putridity in the rennet. The following mode of preserving it in a sweet state, as practised in the West of England, may, therefore, not be undeserving of attention.

"When the rennet bag is fit for the purpose, let a strong solution of salt be made with two quarts of sweet soft water, and add to this small quantities of almost every indigenous and foreign aromatic spice that can be obtained. Boil the whole gently, till the decoction is reduced to three pints, over a clear fire, if possible, or at all events, so that it may not become smoky; next, let the liquor be carefully strained, and poured, in a tepid state, upon the rennet bag. A lemon may now be sliced into it; and, after the whole has stood at rest for one or two days, it may be strained and bottled. If well corked, it will retain its goodness for a year, or even longer, and will communicate an agreeably aromatic flavor to the cheese that may be made with it."

In a case of emergency, or where no good rennet can be procured, a decoction of the yellow flowers of the *cheese-rennet*, or yellow lady's bedstraw, (*Galium verum*, L. which blossoms in July and August,) will answer every purpose for coagulating milk. Or the marine acid, in the hands of a judicious person, may be employed for this purpose as is practised in Holland. The mode of making cheeses in most general use in this country is chiefly as follows, although there are many slight varieties in the practice of different dairies even in the same counties.

Cheshire cheese. The evening's milk is set apart till the following morning, when the cream is skimmed off, and poured into a brass pan heated with boiling water, in order to warm; one-third part of that milk is thus heated. The new milk, obtained early in the morning, and that of the preceding night, being thus prepared, are poured into a large tub, together with the cream. To this is put a piece of rennet, which had been kept in warm water since the preceding evening, and in which a little Spanish annatto (the weight of a quarter of an ounce is enough for a cheese of sixty pounds) is dissolved.* The whole is now stirred together, and covered up warm for about half an hour, or till it becomes curdled; it is then turned over with a bowl, and broken very small. After standing a little time, the whey is drawn from it, and as soon as the curd becomes a little more solid, it is cut into slices and turned over repeatedly, the better to express the whey. Next the curd is removed from the tub again, broken by hand into small pieces, and put into a cheese-vat, where it is strongly pressed both by hand and with weights, in order to extract the remaining whey. After this it is transferred to another vat, or into the same, if it be previously well scalded, where the same process of breaking and expressing is repeated, till all the whey is squeezed from it. The cheese is now turned into a third vat, previously warmed, with a cloth beneath it, and a tin hoop or binder put round the upper edge of the cheese, and within the sides of the vat, the former being previously enclosed in a clean cloth, and its edges placed within the vat. These various processes occupy about six hours, and eight more are requisite for pressing the cheese, (under a press of 14 or 15 cwt.,) which, during that time, should be twice turned in the vat, around which are passed thin wire skewers, and frequently shifted. These skewers are of strong iron wire, about 18 inches long, and the vat and hoop have holes, about an inch apart, through which the sides of the cheese are skewered. Some dairy women also prick the upper surface of the cheese all over, an inch or two deep, in order to prevent its blistering. The following morning and evening it must be again turned and pressed; and also on the third day, about the middle of which it is removed to the salting chamber, where the outside is well rubbed with salt, and a cloth binder passed round it, which serves as a lining to the vat, but is not turned over the upper surface. The cheese is then placed midside up in brine, in a salting tub, and the upper surface is thickly covered with salt. Here the cheese is for nearly a week turned about twice in the day, then left to dry for two or three days, during which period it is turned once, being well salted at each turning, and cleaned, each day. When taken from the brine, it is put on the salting benches with a wooden girth round it, of nearly the thickness of the cheese, where it stands about eight days, during which time it is again salted and turned every day. It is next washed and dried; and, after remaining on the drying

* Marigolds, boiled in milk, are also used for coloring cheese; to which they also impart a pleasant flavor. In winter, carrots scraped and boiled in milk, afterwards strained, will produce a richer color; but they should be used with moderation, on account of their taste.

benches about seven days, it is again washed in warm water with a brush, and wiped dry. In a couple of hours after it is scoured all over with sweet whey batter; which operation is afterwards frequently repeated; and lastly, it is deposited in the cheese or store room, (which ought to be moderately warm, and sheltered from the access of air, lest the cheese should crack,) and turned every day, till it become sufficiently hard and firm.* They require to be kept a long time; and if not forced by artificial means, will scarcely be sufficiently ripe under two or three years, or even more. The Dutch make their cheese nearly in the same manner, excepting that they substitute the marine acid, or spirit of sea salt, which imparts to *Dutch cheese* the peculiarly sharp and salt flavor for which it has long been remarked; and that they leave out the cream.

In Mr. Holland's very intelligent Survey of Cheshire, the following remarks occur on the practice of the Cheshire dairies, from which some important hints may be gathered respecting both that and the general process of making cheese. He says, "this is generally admitted, that not only the quantity, but the quality of the curd as to texture, (toughness, or otherwise,) depends, in a great measure, on the length of time the cheese is in coming; and that the time again depends on the quantity and strength of the coagulum used, the state of the atmosphere, and the heat of the milk when put together. In this stage of the art, where a degree of accurate certainty seems to be required, there is no other guide but the hand, and the external feelings. The thermometer of a Cheshire dairy woman is constantly at her fingers' ends. Accordingly, the heat of the milk when set is endeavored to be regulated by the supposed warmth of the room and the heat of the external air; having reference also to the quantity and strength of the steep; so as that the milk may be the proper length of time in sufficiently coagulating; which is generally thought to be about an hour and a half. The evening's milk—of suppose 20 cows—having stood all night in the cooler and brass pans, the cheese maker (in summer,) about six o'clock in the morning, carefully skims off the cream from the whole of it, observing first to take off all the froth and bubbles, and the rest of the cream is put into a brass pan. While the dairy woman is thus employed, the servants are milking the cows, having previously lighted a fire under the furnace, which is half full of water. As soon as the night's milk is skimmed, it is all carried into the cheese tub, except about three-fourths of a brass pan full, (three to four gallons,) which is immediately placed in the furnace of hot water, in the pan, and is made scalding hot; then half of the milk thus heated is poured to the cream, which, as before observed, had been already skimmed into another pan. By this means all the cream is liquified and dissolved, so as apparently to form one homogeneous or uniform liquid, and in that state it is poured into the cheese tub. But before this is done, several bowls or vessels full of new milk, or perhaps the whole morning's milk, will generally have been poured into the cheese tub.

"In some celebrated dairies, however, they do not, during the whole summer, heat a drop of the night's milk; only dissolve the cream in a brass pan floated or suspended in a furnace of hot water. In other dairies, they heat one-third, one-half, or even more than that of the previous night's milk; but in all, they are careful to liquify or melt the cream well before it is mixed with the milk in the tub;* and whatever may be the general custom in any given dairy respecting the heating of the milk, the practice varies according to the weather. It is generally on poor clay lands that the milk most requires warming: on good rich soils, it will not bear much heating; at least, by so doing, the process of cheese-making is rendered more difficult.†

In making *Gloucester cheese*, as well as other kinds of thin, or *toasting-cheese*, known as the *Trent-side* and *Cottonham*, the milk is poured into the proper vessel, immediately after it has been drawn from the cow; but being thought too hot in the summer, it is lowered to the due degree of heat by the addition of skimmed milk; or, if that will not do, by pouring in water. When the curd is *come*, it is broken with a double cheese-knife, and also with the hand, to separate it from the whey which is ladled off. The curd is then put into vats, which are submitted to the action of the press for ten minutes or a quarter of an hour, till the remaining whey is extracted. It is next removed into the cheese-tubs, again broken small, and scalded with a pailful of water, lowered with whey in the proportion of three parts of water to one of whey, and the whole is briskly stirred. After standing a few minutes for the curd to settle, the liquor is strained off, and the curd collected into a vat, and when the latter is about half full, a little salt is sprinkled over and worked into the cheese. The vat is now filled up, and the whole mass of cheese turned twice or thrice in it, the edges being pared, and middle rounded up at each turning. Lastly, the cheese is put into a cloth, and, after undergoing another pressure, it is carried to the shelves, where it is turned, in general, once a day, till it become sufficiently close and firm to admit of its being washed. The only material difference is, that Gloucester and Trent-side are rather thicker than the Cottonham—which is not more than an inch and a half in depth, and is therefore sooner

* The cheese rooms in Cheshire are generally placed over the cow houses on a floor strewed with rushes. This is done, in order to afford them, from the heat of the cattle below, that uniform and moderate degree of temperature, which is deemed essential to the proper ripening of cheese.

* The practice in this respect is different in Scotland, in districts of which country the manufacture of cheese, particularly the *Dunlop*, has been carried to great perfection. There the cream, when separated from the milk, is put into the curd-vat cold, and brought, by the admixture of warm milk, to the general warmth of the mass at setting the curd. Mr Aiton is of opinion, that by melting the cream, much of the oily matter it contains is carried off with the whey, and impoverishes the cheese: but he admits that he has not had sufficient experience of that practice to enable him to decide on its comparative merit with the Scotch method.

† This although the opinion of Marshall and other celebrated writers, as well as that of Mr. Holland, is contradicted by Mr. Aiton, who says, "I never understood that the milk of cows so fed, (on poor clays, or even wild waste land, or moss,) required to be heated more than that of cows fed on the warmest valleys or richest haughs in our best cultivated districts."—*Dairy Husbandry, p.* 128.

ready for the table than the others; and that the latter is put together rather hotter than the two former.

Much of what passes under the names of *Double Gloucester*, and of *Cheddar Cheese*, is made in Somersetshire, by the following simple process:—

When the milk is brought home, it is immediately strained into a tub, and the rennet is added, in the proportion of about three table-spoonsful to a quantity sufficient for a cheese of twenty-eight pounds; after which it remains undisturbed for about two hours, when it becomes curd, and is broken. That done, three parts of the whey are warmed, and afterwards put into the tub for about twenty minutes: the whole whey is then again put over the fire, made nearly scalding hot, and returned into the tub, to scald the curd, for about half an hour, after which part of the whey is again taken out, and the remainder left with the curd until it is nearly cold. The whey is then poured off, the curd broken very small, put into the vat and pressed, remains there nearly an hour, and is then taken out, turned, and put under the press again till evening; when it is turned, and put in again until the next morning. It is then taken out of the vat, salted, put into it again with a clean dry cloth round it, and remains in the press till the following evening, when it is again taken out, salted, put into the vat without a cloth, and pressed till the next morning: it then finally leaves the press, and is salted once a day for twelve days.*

Stilton Cheese has only been introduced since about the middle of the last century. It was first made by a Mr. Paulet, who resided in the Melton quarter of Leicestershire, but who, being a relation of the landlord of the Bell Inn, at Stilton, on the great North road, supplied his house with cheese of such a singularly superior quality, that it became in demand beyond the consumption of the house, and was then sold so high as half-a-crown a pound.† It thus acquired the name of Stilton Cheese; but the mode of making it having been soon discovered, it is now generally made throughout all the neighboring counties; the sale is no longer confined to Stilton, and much of what comes to market under that denomination is of very inferior quality. Its richness depends, of course, both on the breed of cows employed, and the quality of the pasture on which they are fed, as well as upon the quantity of *cream* used in the making up; for, unless a large portion of this be added to the milk, the cheese will be deficient in all the essential qualities for which it is remarkable.

It is commonly made by putting the night's cream to the milk of the following morning with the rennet; and as soon as the curd is come, it is taken out *whole* and put into a sieve, gradually to drain. While it is thus draining, it is pressed till it become dry and firm, and is then removed into a wooden box or hoop, adapted to its size; this sort of cheese being so very rich, that it would separate or fall to pieces were not this precaution adopted. Afterwards it is turned every day on dry boards, cloth binders being tied round it, and which are made tighter as occasion may require. After it is removed from the box or hoop, the cheese is closely bound with cloths, which are changed daily, till it become sufficiently compact to support itself; when these cloths are taken away, each cheese is rubbed over every day once (and if the weather be moist or damp, twice,) for two or three months, with a brush, which is also done every day to the tops and bottoms of the cheeses before the cloths are removed. Sometimes it is made in a net like a cabbage-net, which gives it the form of an acorn. Stilton cheeses are not sufficiently mellowed for use, until they are two years old; and will not sell unless they are decayed, blue, and moist. In order to accelerate their maturity, it is no uncommon trick to place them in buckets, and cover these over with horse-dung. Wine is also said to be added to the curd, in order to produce a rapid advance of ripeness.

In making *Wiltshire cheese* (which is admitted to be among the best English sorts) the milk is "run" as it is brought from the cow; or if it be of two warm a temperature, it is lowered by the addition of a little skimmed milk. The curd is, in the first, place, broken with the hand to various degrees of fineness, according to the sort of cheese intended to be made. Thus, for *thin* cheese, it is not reduced so fine as in the county of Gloucester; for the *thick* kind, it is broken still finer; and for *loaves* it is almost crushed to atoms. But, in first breaking the curd, care is taken to let the whey run off gradually, lest it should carry away with it the "fat of the cowl." As the whey rises it is poured off, and the curd pressed down; after this it is pared, or cut down, three or four times, in slices, about one inch thick, that all the whey may be extracted, and is then scalded in the same manner as Gloucester cheese. In some dairies it is the practice, after the whey is separated, to re-brake the curd, and salt it in the "cowl;" but in others, it is taken, while warm, out of the liquor, and salted in the vat. The thin sorts are disposed, with a small handful of salt, in one layer; thick cheeses, with two handsful of salt, in two layers; and loaves, with the same quantity, in three or four layers; the salt being spread, and uniformly rubbed among the curd. In general, Wiltshire cheese is twice salted in the press beneath which it continues, according to its thickness: the thin sorts three or four "meals;" thicker ones four or five, and *loaves* five or six.

Dunlop cheese is made in the counties of Ayre, Renfrew, Lanark and Galloway, of various sizes, from twenty to sixty pounds. After the milk is brought to a certain degree of heat, (about 100 degrees of the thermometer upon an average, though in summer ninety will be sufficient, as, on the contrary, during winter, a higher degree will be requisite,) it is mixed with the cream which had been previously skimmed, and kept cool; the whole is then poured into a large vessel, where the rennet is added to it, and which is closely covered up for a short time, perhaps ten or twelve minutes. If the rennet be good, it will have effected a coagulation of the milk, which is gently stirred, when the whey begins immediately to separate, and is taken off as it gathers, until the curd become tolerably solid. It is then put into a *drainer*, (a vessel made for the purpose, the bottom of which is perforated with small holes,) and the cover of which is pressed down with any convenient weight. After it has thus stood for some time, and is pretty

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* Communication in the Agricultural Survey of the County of Somerset. 3d Edit. p. 247.

† Marshall's Midland Counties. 2d Edit. Vol. I. p. 320.

dry, it is returned into the first vessel or dish, where it is cut into very small pieces by means of a cheese-knife, which is furnished with three or four blades, fixed on prongs from the handle, that cut in a horizontal direction; and it is thus turned up and cut every ten or fifteen minutes, as well as pressed with the hand until all the whey is extracted. The curd is then once more cut as small as possible, and it is then salted, by the hand, care being taken to mix it minutely with the mass. Lastly, it is put into *cheesitt*, or *chessart*, a stout dish with iron hoops, which has a cover that goes exactly into it: a cloth being placed between the curd and the vessel. In this state it is submitted to the action of the cheese-press, when it is occasionally taken and wrapped in dry cloths, till it is supposed to have completely parted with the whey: it is then laid aside for one or two days, when it is again examined; and, if there be any appearance of whey remaining, the pressure and application of cloths are repeated. As soon as it is ascertained that the whey is extracted, the cheese is generally kept for a few days in the farmer's kitchen in order to dry them before they are placed in the store, where a smaller degree of heat is admitted. While there, they are turned three or four times a day until they begin to harden on the outside, when they are removed to the store, and turned twice a week afterwards. After the cheese is cured, various modes are adopted in polishing them for sale, which are rather injurious than beneficial; nothing further being requisite, besides turning them, than to rub them occasionally with a coarse cloth, especially after harvest, because at that time they tend to breed mites.*

It is, however, worthy of notice, that the practice differs, in one material point, in the best dairies; in some of which the cream is carefully separated from the milk, while in others, the milk is allowed to cool, but thickened as taken from the cow; it being thought that, "if the milk be allowed to stand till the cream separates from it, the cream can never again be completely blended with it, or retained in the curd when set, and the cheese is poorer; and this, without great care in the management, to a considerable extent."†

Green cheese is made by steeping over night, in a proper quantity of milk two parts of sage with one of marigold leaves and a little parsley, after being bruised, and then mixing the curd thus *greened*, as it is termed, with the curd of the white milk. These may be mixed irregularly or fancifully, according to the pleasure of the maker. The management is in other respects the same as for common cheese. Green cheeses are chiefly made in Wiltshire.

Skim cheese is chiefly made in the county of Suffolk, whence it is sometimes called *Suffolk cheese*. The curd is broken in the whey, which is poured off as soon as the former has subsided; the remaining whey together with the curd, being thrown into a coarse strainer; and exposed for cooling, is then pressed as closely as possible. It is then put into a vat, and pressed for a few minutes, to extract the remaining whey. The curd being thus drained from the whey, is taken out, again broken as finely as possible, salted, and submitted to the press. The other operations do not materially vary from those adopted in other cheese-making districts, but they are more easily performed on the curd of skim milk, as it is more readily coagulated and separated from the whey, and requires less subsequent care and pressing than that of milk and cream united. The Suffolk cheese forms in general, part of every ship's stores, because it resists the effects of warm climates better than others; but it is remarkable for "a horny hardness, and indigestible quality." A better kind is made in Dorsetshire, although the only perceptible difference in management consists in its being put together cooler; for, by putting milk together hot, and immediately applying the rennet, the whey drains so quickly as to impoverish the cheese, and render it tough.

Cream cheese is generally made in August or September, the milk being at that time richer and fatter than at other periods of the year. Not having the warm season to ripen it, this kind of cheese is generally made somewhat thick, in order to preserve its mellowness. Cream cheeses are more liable than the leaner sorts to accidents, owing to chillness, or the being frozen before they become hard: for when frost once penetrates a cheese, it destroys every good quality, and generates putrefaction, or makes it become either insipid or ill tasted. Hence this kind of cheese should always be kept in a warm situation, and be particularly guarded against frost, and till it has sweated well; otherwise all the advantage of its rich quality will be completely lost.* Cream cheese is, however, in general only wanted for immediate use; and that kind commonly so called is in fact, little else than thick sweet cream dried, and put into a small cheese-vat, about an inch and a half in depth, having holes in the bottom, to allow any whey that may exude, to pass, and having rushes, or the long grass of Indian corn, so disposed around the cheese as to admit of its being turned without being handled. It is thus, that the celebrated *Bath* and *York* cream cheeses are made, when genuine; but the greater part of those commonly sold are in part composed of milk.

New cheese, as it is usually termed in London, or, provincially, *slip-coat*, is, on the contrary, an early summer cheese, which is made of new milk, and about one-third of warm water. When the whey is removed, the curd is carefully kept entire, and spread upon a cloth, to the thickness of less than an inch. It is then very gently pressed, for a few hours only, and when removed from the vat, it is covered with a cloth, and placed in a warm situation, as it requires to be brought forward immediately; the management is therefore different from that of other cheese.

These are the kinds of British cheese, and in most general esteem; the other sorts, together with foreign cheese, are both too numerous and too uninteresting to the generality of dairy-men to admit of detail. The process of making cheese is much more difficult than that of making butter; and the quality depends more perhaps on the mode of performing that operation than on the richness of the milk. The temperature at which the milk is kept before it is formed into cheese, and that at

* Farm. Mag. Vol. IV. p. 381; see also, the Ayrshire Report; and Aiton on the Dairy Husbandry.

† See the Library of Useful Knowledge; Farmer's Series, No. XII. p. 45.

* Twamley on Dairying, p. 64.

which it is coagulated, or turned into curds, are objects of the greatest importance in the management of a cheese dairy: the former ought not to exceed 55°, nor to be under 50° of Fahrenheit's thermometer; and for the latter it should be at 90° to 95°. If the milk is kept warmer than 55° it will not throw up the cream so well as at the lower degree, it is also subject to get sour and give a bad taste to the cheese; and if it be allowed to be much colder than that, it becomes difficult to separate the curd from the whey, and the cheese made from it will be soft and insipid. If the curd be coagulated too hot it becomes tough; much of the butyraceous matter will go off with the whey; and the cheese will be hard and tasteless. The thermometer should, therefore, always be employed in every dairy; and, although the servants may at first be prejudiced against it, yet its evident utility, and great simplicity, will eventually reconcile them to its use.

The greatest care should be taken thoroughly to extract every particle of whey from the curd; for no cheese will keep well while any whey remains, and if any part become sour, the whole will acquire a disagreeable flavor. Similar effects are produced by the use of an immoderate quantity of rennet; it is also apt to blow up the cheese full of small holes; and this last effect will be produced if it be allowed to remain too long on one side.

Sometimes it happens that cheese will *hove* or swell, either from some accident, or from inattention in some part of the process. Mr. Holland attributes it partly to the cows being fed on clover: he also thinks that the cracking of cheese is occasioned by the use of lime on the pasture; but these observations have not been corroborated by general experience. To prevent, as likewise to stop, this hoving, it has been recommended to lay such cheeses in a moderately cool, dry place, and regularly to turn them. Whenever any one becomes considerably swollen, it will be requisite to prick it on both sides in several places, particularly where it is most elevated, by thrusting a large awl, or pin, pretty deeply into it; repeating this as often as may be necessary. Though the pricking, it is observed, will not altogether prevent the swelling, yet it will, by giving a passage to the confined air, render it less considerable, and the cavities of the cheese will neither be so disagreeable, nor consequently so unsightly or unpleasant to the eye.

A very experienced dairyman* is of opinion, that from nine to twelve months' time are requisite to ripen cheese of any kind, if from fourteen to twenty pounds weight; and lays it down as a rule, in the process of making cheese, that the hotter it is put together, the sounder it will be; and the cooler, the richer, and more apt to decay. He also recommends the use of a small quantity of *loppered*, or sour milk, as a preventive of its rising, which is one of the worst accidents to which it is liable. It should be kept in an airy but not in a cold place, and if the moderately dried leaves of the tutsan, or park leaves, as it is provincially termed (*hypericum androsæmum*, L.;) or, of the yellow star of Bethlehem, (*ornithogalum luteum*, L.;) or, if the young twigs of the common birch-tree be placed on the surface or sides of cheeses they will—especially the tender branches of the birch—be found very serviceable in preventing the depredations of mites. It is a good practice to strew a little dry moss, or fine hay, upon the shelves on which the cheeses are laid; as, when new, they sometimes adhere to the board, and communicate a dampness to it that is prejudicial to the other side of the cheese, when turned: it also promotes their drying. At a more advanced stage they may be laid upon straw; but at first, it would sink into, and deface, the surface. To which we will add, as general maxims—that great cleanliness, sweet rennet, and attention to the heat of the milk and breaking the curd, are the chief requisites in cheese making.

[To be continued.]

* Mr. Parkinson, Treatise on Live Stock, Vol. I. Ch. I. Sect. 12.

From the New York Farmer.

EXTRACTS FROM AN AGRICULTURAL TOUR*

Sheep husbandry in New England.

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Elias Taylor, of Charlemont, a shrewd and intelligent farmer, gave me some account of his operations, which I record, because the opinions and practices of observing and intelligent husbandmen, even on familiar subjects, though they may contain nothing original, are worth remembering. He is familiar with the business of fattening sheep for the market, and, as I know from the best authority, has pursued it with great success.

His general practice has been to sell them after shearing. He is of opinion that it is more profitable to buy, for this purpose, wethers than ewes. He prefers merinos on account of the superior value of the fleece; dislikes Saxony for their inferior size; and thinks merinos are kept at less expense than native sheep; chooses to buy them of different ages, and puts them in his pastures, so that he may select such as are suitable, and have them come along in succession; considers five years old as the best age for fattening; chooses to feed them moderately until a short time before he designs to market them, as he thinks they will not pay the cost of high feeding for a long time; often begins to fatten in March, sheep which he designs to market immediately after shearing. His store wethers he is accustomed to keep in the yard with his cattle, upon the orts and husks which are thrown out to them. His wethers for fattening he keeps upon rowen the first part of the season; and after he begins to feed them upon corn, he takes care, he says, not to allow them to be hungry; to feed them with regularity; and never suffers them to be disturbed. His wether sheep often give four pounds of washed wool at shearing.

He mentions an experiment in feeding swine which deserves notice. He put up four swine, and fed them with potatoes and Indian meal, at the rate of three bushels of potatoes to one peck of Indian meal. He boiled the potatoes, and while hot, mashed them with the Indian meal. He then added cold water, and left the mixture to ferment, and when it became sour, he fed his swine freely with it. He says that he never had his

* By the Rev. Henry Colman, of Massachusetts. Ed. Far. Reg.

hogs thrive so well; that they gained surprisingly well; and were fed at a small expense.

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I found some superior and well managed farms in this vicinity on the river, [the Hoosic, in Vermont;] and an intelligent and very civil man, by the name of Wright, a deputy sheriff, as I afterwards learnt, and a farmer, at whose house I stopped, was kind enough to give me considerable information of the agriculture of this part of the country. My attention was arrested by the appearance of a small field, covered with the thickest mat of white clover which I had ever seen. I stopped to inquire if it had been plastered, and found this to be the fact. Plaster, or gypsum, is applied to their oak lands with great success; but not with equal advantage to lands where the growth was maple. For this fact, if indeed it be well established, I do not pretend to account. The mode of operation of this extraordinary manure or vegetable stimulant, is still enveloped in mystery. No theory of its operation, though many plausible ones are given, has yet satisfied me. Facts are all that we have as yet got that are of any value. There is every where, in all the processes and operations of the material and intellectual world, a limit beyond which human sagacity cannot penetrate; and from which, however bold and persevering its efforts to pass may be, it is invariably driven back with the humiliating consciousness of its own impotency and ignorance. The grass and oat crops were highly luxuriant; and making due allowance for the extraordinary season, (1832,) Indian corn appeared remarkably well. The haying season had just commenced. The grass was principally herds grass and red top. The crop appeared heavy; they mowed, however, only once, as they were accustomed to feed their meadow lands closely and very late in the season, oftentimes into June, which, upon the whole, they deemed a bad practice; and they were of opinion they should get more hay by two mowings.

Large crops of oats and corn might be obtained by different management. The crops were estimated by Mr. Wright to average thirty-five bushels of oats, thirty-five bushels of corn, and two tons of hay to the acre. This, however, was probably only a conjectural estimate, as few farmers ever take the pains to weigh or measure any thing. Their produce is applied chiefly to the feeding of sheep. The yearly expense of keeping a sheep is estimated at one dollar. This likewise must in general be mere matter of conjecture. It can only be accurately determined by a careful estimate of the actual value of hay and grain; and not their market value, but their value consumed on the place, making due allowance for the valuable returns of manure; and there must enter into the estimate the labor of attendance, the value of pasture land and fencing; and then, too, a careful ascertainment of the amount of pasture required for, and the amount of hay and grain consumed by a sheep, and necessary to his profitable condition. Now these are calculations into which few farmers have the patience to enter; and one dollar per head is therefore only a conjectural estimate of the cost of keeping a sheep, formed from no accurate standard; and you can only infer from this statement, that they find their husbandry profitable, or yielding a satisfactory return at the close of the year, when they can receive for the pasture occupied, and the hay and grain consumed, by a healthy sheep, the value of one dollar. It has been found by actual experiment, that seven healthy sheep will consume one ton of hay in 135 days, the average of our winter foddering—or a little more than two pounds each per day. If we value this hay at six dollars per ton, and this is certainly, considering the cost of labor, a low price, the cost of the hay consumed by each sheep would be 85 cents. We have then about 33 weeks of pasturing to provide for, which cannot be rated at less than one and a half cents per week—or say 50 cents—which would make the keeping of a sheep, even at low rates, equal to one dollar and thirty-five cents per year. I make these calculations to show how careless almost all conjectural estimates are in matters of this kind. Whether however, his pecuniary estimates are critically exact or not, if the farmer at the close of the year is satisfied with the balance of his receipts over his expenditures, if he is so fortunate as to find the balance on that side, he may be well contented with his numerous privileges and blessings, though his gains in arithmetical amount may seem small compared with those of other trades and professions.

The amount of wool obtained from their sheep averages about three pounds of fine, their sheep being principally of the merino and Saxony race; and sold this year at 42 cents per lb. A Mr. Wright, neighbor of the one above named, has a flock of 700. His annual loss by disease or accident is a very small per centage, which he attributes to the circumstance of his never housing his sheep at any season, as he was formerly accustomed to do. His opinions and experience in this matter are entirely at variance with the opinions and experience of many distinguished and successful sheep farmers; and especially of one, whose authority on this and various agricultural subjects, from his experience, education and intelligence, is entitled to great respect; I mean Mr. H. D. Grove, of Hoosic. He says, "shelter against the inclemency of the weather is almost as necessary to the health and good condition of the sheep as food itself; and for this reason stables built for that purpose are of great benefit. Not only do sheep do much better, but it is also a great saving of fodder and manure." Mr. Wright's lambs are yeaned in May. His wool is sold on the farm. The general appearance of this farmer's grounds and crops attracted my particular attention as highly creditable. The intervals furnish abundant crops of hay and grain, and the neighboring hills afford pasturage in plenty of the best quality.

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Comparative value of different kinds of corn—what crops to manure.

* * * The corn cultivated here [near Stillwater in New York,] is of the eight rowed kind; rather a small ear; and though not white, yet not of that deep yellow which we sometimes see. This corn was recommended for the small size of its cob; but I am disposed to believe, from some careful examinations, the results of which were communicated to the public through the columns of that admirably conducted journal, the Genesee Farmer, that the weight of cob in the different varieties of corn will be found to bear a pretty equal

proportion to the weight of grain upon it; and in this matter, therefore, the small will be found to have no advantage over the large ears. I speak particularly of the flint corn, having made no examination of the gourd seed varieties, where I suspect the advantage will be perhaps more in favor of the large ear. There is however one advantage on the side of the corn with a small cob, which deserves much consideration. The corn with the small cob is more likely to be dry and sound, and becomes merchantable earlier than that with a large cob. The large cob retains its moisture much longer; and where the season is backward, or the corn late, or where it is harvested by being cut up at the bottom while the stalks are green, and ripened in the stack, there is danger, especially if the season be unfavorable, of its not drying sufficiently, and of its becoming mouldy in the bin. I have known serious losses to accrue from this circumstance, especially where the corn after being husked had been placed in large heaps, and the granary not well ventilated. This, in fact, is the only objection I have to what is called the Dutton corn, so much commended by Judge Buel, and of which he has exhibited at the agricultural shows some splendid samples; and also to other twelve and fourteen rowed varieties. This circumstance, as I have recently learned, has induced some very intelligent farmers in New Hampshire, on the Connecticut river, to give up the cultivation of the Dutton corn for the eight rowed varieties. The large twelve rowed corn will, I believe, produce ordinarily more bushels to the acre than the small eight rowed corn. A good sized ear of the twelve rowed will yield more than half a pint of shelled grain; one of the small eight rowed will not exceed a gill. A field of the twelve rowed will yield generally one good ear to a stalk; a field of the small eight rowed will do no more; for I have not found, in my own cultivation, that the eight rowed is more likely to produce two ears to a stalk than the twelve rowed. Its producing two ears in either case, depends, in my opinion, something upon the selection of seed from twin-bearing stalks, but more upon wide planting; as corn which is crowded or closely planted will very rarely produce more than one good ear to a stalk; if there is a second, it is commonly imperfect, and a mere nubbin. It is obvious, then, that the twelve rowed corn will yield more than the eight rowed to the acre; but it will not yield twice as much, because the small kind will bear much closer planting than the large kinds, as the stalks and leaves are not nearly so luxuriant. The kind grown in this part of the country was remarkable for its low growth, and the ears being set very near to the ground, the stalks being in this case small, the fodder is more easily saved, but the yield of herbage is much less to the acre. It may be expected on this account to ripen earlier. The small amount of stalks and leaves is, I believe, attributable to their not manuring their corn lands, rather than to any peculiarity in the kind of corn. That high manuring in the same year of planting the corn will produce a great amount of stalk and leaf, is well known; but that the actual yield of grain is always in proportion to the luxuriance of the plant, is a point not so well established, and upon which I should be extremely glad of the opinions of observing and practical farmers. That the extraordinary luxuriance of the plant will delay the ripening of the grain is certain. Market-men near our large cities understand this, as they never manure the peas which they wish to bring forward very early; and it is a common observation, how well founded I will not say, that the very high manuring of potatoes causes them to "run too much to vine;" and the quantity of potatoes in the hill is not always in proportion to the luxuriance of the tops.* Whether in such cases, if the season were long enough to admit of the perfect maturity of the plant, the yield of grain and of tubers would not correspond with the great luxuriance of the herbage or stalks, is another query which grows out of the subject, and deserves inquiry and attention, as it is a matter of great practical importance to ascertain, if possible, (which can only be done by long observation and experiment,) to what degree corn, potatoes, or other plants, may be safely and advantageously forced by manure, with a due regard to the actual return in grain or tubers. I have spoken above of the small varieties of the eight rowed corn, though not of the smallest. The Hoosic corn is larger than what is called the Canada corn, though probably it is the same, and has acquired a larger size from successive planting in a lower latitude. The ear is about ten inches in length. A kind of eight rowed corn is grown on the Deerfield meadows, which frequently measures sixteen inches in length, and from a single ear of which I have sometimes obtained a full pint of grain. It ripens late, however, and requires early and very wide planting. On our fine alluvions, with high manuring, it yields about fifty bushels to the acre. It weighs from fifty-seven to sixty pounds to the bushel, whereas, my twelve rowed and a small eight rowed corn, which I have grown upon a thin soil, weigh from sixty to sixty-four pounds per bushel.

Another inquiry connected with this subject deserves attention. Is the color of the corn any index of its nutritious properties? This is a subject for experiment, and for chemical analysis. Between the varieties of the yellow and the white flint corns, I have made no experiments. The prejudices in favor of the one or the other in different parts of the country, where the one or the other is cultivated, are strong, and as in most other cases exactly coincident with the interests or habits of different individuals; those who grow and eat the yellow pronouncing the white tasteless, and those who grow and eat the white, with the same self-complacency, disdaining the yellow. But between the yellow flint of the northern states, and the white gourd seed of the south, I am inclined to believe there is a difference in nutritious properties in favor of the former. This opinion is formed only on a single experiment, which I made some years ago; but of which I preserved no written record, and can only state it from memory,

* These views accord with the reasons given in a former No. of the Farmers' Register, (p. 257, Vol. I.) in favor of applying manures, in preference, to those crops in which general bulk is wanted, instead of those of which the quantity of seed is the object—or, for example, to the crops of grass, in alternate husbandry, rather than to the wheat or corn which follow them.—Ed. Far. Reg.

and therefore not with that minute accuracy which I should desire in all such cases to observe. I had a cow, which I put in the barn in October; fed her abundantly with hay, and gave her four quarts of meal per day of the yellow flint corn; saved all the milk, and weighed her produce in butter, which during the week was nine pounds. The second week her feed was the same as before, excepting that the meal given her was the meal of the white gourd seed, or what goes among us by the name of Virginia, or southern flat corn. Her produce this week in butter fell short of eight pounds. The third week I fed her as before in quantity, and returned again to the meal of the yellow flint corn; and her produce in butter was as the first week, nine pounds. I took the exclusive care of her myself during the time, and can assign no cause for the difference in the product but the difference in the quality of the meal. There may have been other causes, however, and I by no means regard a single experiment as decisive on this or any similar subject. The meal in the several cases was measured, but not weighed; the actual quantity given, therefore, though it appeared the same, might not have been the same; and I record the experiment because I deem all such trials, where all the circumstances connected with them are detailed, of some value; and in the hope that it may induce others to make similar experiments in other matters as humble; for which experiments, if they speak of them, they may get nothing from their overwise neighbors but the sneers of real ignorance, indolence, and self-conceit, the usual attendant of ignorance and indolence, but from which they will derive themselves much pleasure and satisfaction. They are attended with little trouble or expense, and from them, in some cases, the most important results may be obtained.

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The land, as I approached the Hudson, became thin, and strongly predominating with sand, though favorable to Indian corn, and well suited to the renovating influence of clover and gypsum; that beneficent operation by which much of the land in Columbia county, in the neighborhood of Kinderhook, has been converted from pine barrens into highly productive fields; and according to the interesting and gratifying account of Mr. Teunis Harder, given in the Quarterly Journal of Agriculture, Vol. I., No. 1, p. 32, has actually raised the value of these lands from three to sixty dollars per acre.* Nearer the river the character of the soil became much better, and within a mile of the ferry I found a superior farm, in high cultivation, belonging, I have since been informed, to a Mr. Knickerbocker. The corn crops here were very promising. I have since passed this farm, and its condition is highly creditable to its owner. I have seen, too, in this neighborhood, a herd of uncommonly fine swine; indeed, for store hogs, as many together, I have seen none superior in appearance.

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I crossed the Hudson at this place in a ferry boat impelled by a horizontal wheel, moved by two horses. The horses had been several years attached to the boat, and though unable to see the shore, they measured the distance with great accuracy, stopping of their own accord at such a distance before they reached the shore, that the impetus which the boat had already received was nearly sufficient to carry it to the land, and when ordered to start again, turning it only one revolution and stopping again without direction. I could not help wishing that men were half as tractable.

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Earl Stimson's Farm.

A principal object of my journey soon presented itself at a distance of two miles, which was the farming establishment and residence of Earl Stimson, Esq., whose dwelling house and numerous out-buildings, placed on a commanding eminence, had more the appearance of a village than the domain of a private individual. His buildings consist of a spacious dwelling house, with extensive piazzas in front, several barns and stables, very extensive sheds, a large store, a three story building for a granary, cider house, &c.: a large slaughter house, cooper's shop, potash establishment, blacksmith's shop, and smaller dwelling houses, which, with the fame [farm?] connected with them, had come into his possession, and might now be said to form a part of his domicil.

The situation, being at the rectangular junction of two large roads, was favorable to the prosecution of his business as an extensive trader, and the keeper of a large hotel. The homestead includes about seven hundred acres, two hundred of which are in wood; and the rest in meadow, pasture, or under the plough. He has himself favored the public with an account of his management and cultivation, in his address to the Saratoga Agricultural Society; and an exact and detailed statement of the produce and course of crops of a certain portion of his land is given by Dr. Steele, in his survey of the agriculture of Saratoga County, in New-York Memoirs of Board of Agriculture, Vol. II., p. 69. I shall, however, detail from recollection the accounts which I received from himself; and record such remarks as suggested themselves on the premises.

The soil is generally of a dark loam, resting upon sandstone and carbonate of lime. The analysis of this soil, as given by Dr. Steele, is subjoined:

Water,	9.5
Animal and vegetable matter,	12.5
Alumine,	17.5
Siliceous sand,	54.
Carbonate of lime,	3.
Soluble salts,	1.
Oxide of iron,	1.
	98.5
Loss,	1.5
	100.

The great roads passing through the farm, and crossing at its centre at right angles, give a straight line to all the outside fences; and the fields, every where divided into rectangular lots of eight

* This account was first published in the Farmers' Register, (p. 544 Vol. I,) and we presume was copied into the work to which it is credited above—which however we have not seen.—Ed. Far. Reg.

or ten acres, are enclosed by stone walls, formed of small stones gathered from the land, and surmounted by posts and two rails. The cultivation exhibited an exemplary neatness, as in but a single instance did I remark any weeds or briars growing near the fences; and these had been recently mowed.

Mr. Stimson is highly systematical in his farming, and pursues a determined rotation of crops, beginning usually with wheat, then corn, barley, clover, and herds grass two or three years; then frequently depastures his fields for one year, after which they are again subjected to the plough, following the same rotation as before, excepting that corn is sometimes a first crop after the land is broken up; and flax sometimes takes the place of corn or barley in the rotation.

He manures his land once only in six years, excepting the application of plaster to his corn. He allows five loads of barn manure, and three of leeched ashes, to an acre; and this is always spread upon the surface after ploughing for the first crop and either harrowed or ploughed in by a very light ploughing. In ploughing, he never permits the plough to go deeper than three inches; the sod is turned over flat, and then rolled, it being his great object to keep all the vegetable matter on the surface. In the ploughing for the second crop in the rotation, the sod being completely decomposed, is turned, and affords a fine soil for the ensuing crop. Though a good deal of the manure is in this way lost by evaporation, yet he considers this loss as much less than that which is occasioned by burying it under the sod. He deems leeched ashes a most valuable manure, and much to be preferred to that which is unleeched, which he considers as having a tendency at first to force the land, but in the end to impoverish it. Next to leeched ashes, he deems lime the best manure for land. The opinions of so intelligent, experienced, and successful a farmer, are certainly entitled to the highest respect, and we shall not undertake to theorize on the subject; but the subject is still matter for experiment, and deserves the most careful and philosophical investigation.

Wheat is generally the first crop in the rotation, in which case it is usually sowed in the autumn; and harrowed in at the rate of two bushels to the acre. His average crop is from thirty to forty bushels per acre. This year (1832) he has sixty acres in wheat. Of Indian corn, his average product is about five thousand bushels. He assured me that for the last ten years it had exceeded the average rate of one hundred bushels to the acre. He plants an eight rowed kind, with a small ear, on the ground where he has had wheat, in hills two feet eight inches apart each way; the places of planting being accurately marked out by a simple machine with four teeth, like a rake, and drawn by a horse, which marks the piece to be planted in one direction, and then crosses these marks at right angles. Four stalks only are left in a hill, and it is ploughed slightly, or harrowed twice. Sometimes plaster is applied to the hill, at the rate of about five pecks to an acre. He is of opinion that too much manure may be applied for any crop excepting corn. This cannot be manured too highly. Owing to the unfavorableness of the season, his corn, much of which had been planted twice, seemed quite small, and in his opinion would hardly yield him a third of the usual crop.

Potatoes are planted by him at the same distances as his corn, and on the outside of his cornfields. At the second hoeing of his potatoes, he takes pains to open the top of each hill with the foot, and to put a hoefull of dirt directly on the centre, by which means the sun is admitted to the potatoes, which he deems likely to contribute very much to the increase of the crop. This simple operation is in accordance with Mr. T. A. Knight's lately broached views of the great importance of light and air to the productiveness of the potato crop; but in a partial experiment, I have not myself perceived any sensible advantage from it. His average yield of potatoes is about five hundred bushels to an acre; and he raises yearly about two thousand bushels.

Flax is likewise a valuable crop, of which he calculates to obtain at least twenty bushels of seed, and four hundred pounds of flax; commonly more than this. His flax fields, which he was then pulling, with a platoon of sixteen men, exhibited a most luxuriant growth. After the flax is pulled and rotted, he has it cleaned and prepared for market, for two and one-half cents per lb. What he usually obtains over six cents per pound for flax, will pay for the cleaning of it. He is of opinion that it will do to repeat flax on the same land once in six years. Barley, or rye is another crop in his usual rotation, and ordinarily follows corn. Barley he considers as much the best crop with which to lay down his land to grass.

His plan of laying down his land to grass is to sow the grass seed at the time he sows his barley, at the rate of 3 lbs. of clover seed, and 4 quarts of timothy or herds grass. His crop of grass averages about two and a half tons to an acre. He feeds many of his mowing fields until the 10th of June. His grass, as I saw it, was quite ripe, and farther advanced than we are accustomed to have it at the time of mowing; and this, perhaps, accounts for his practice of cutting his grass in the morning, and housing it at night of the same day, which he informed me he frequently did. The proper time of cutting grass, as with reference to their nutritive properties, is a subject which has not received all the attention which it deserves. According to chemical analysis, some grasses are much more nutritive after their seed is perfected, than when cut in the flower. It is the reverse with other grasses. In respect, for example, to timothy or herds-grass, (Pheum pratense,) according to Sinclair's table annexed to Davy's Agricultural Chemistry, it is said that "the nutritive powers of the straws simply therefore exceed those of the leaves in proportion as 28 to 8; and the grass at the time of flowering, to that at the time the seed is ripe, as 10 to 23; and the latter math to the grass of the flowering crop, as 8 to 10."

Mr. Stimson mows his grass land usually two years; and pastures it the ensuing year. This completes his rotation of six years, and he then begins the same course again. Thus,

1, Wheat—manured.
2, Corn—plastered.
3, Flax, rye, or barley.
4, Clover and herds grass.
5, Clover and herds grass.
6, Pasture.

His potatoes are usually planted round his corn fields, three or four rows on each side, so as to render

it convenient to come out with a horse, and turn the plough. He puts one large or two good sized potatoes in a hill. He steeps his seed corn before planting, in a mixture of ¼ lb. of saltpetre, to 3 pints of water; and then rolls the seed in plaster.

He purchases large numbers of cattle in the fall; those which are in condition to kill, he slaughters and packs; and it is then forwarded to the New York market, where it is repacked, inspected, and fully salted, at the expense of 75 cents per barrel. The cattle not in condition for beef, he winters, and disposes of the next spring and autumn.

He kills and packs great quantities of pork, and bacons the legs. For packing his beef, he uses four quarts of salt, with some saltpetre; and for his pork, fourteen quarts of salt to each barrel, which he deems sufficient to keep it until it is repacked in New York. He considers this a better mode of disposing of his pork and beef, than to send his cattle on the hoof, or his pork unsalted, to market.

His preparation for his hams is 4 oz. saltpetre, 4 qts. of salt, 1 pint of molasses, 1 oz. of pearlash, to 100 cwt. of meat. They are to be smoked three weeks with maple or walnut wood. Recently he slaughtered twenty hogs, whose average weight was 414 lbs. each. His hams are preserved by being sowed in paper, or coarse bags, whitewashed, and suspended in his storehouse. He has at present 700 sheep, which he considers as a profitable stock. He has thirty cows. He has paid little attention to the improvement of his stock, selecting his cows from the numerous droves which he purchases for feeding or slaughter. He never puts his young cattle in the barn. He has large and commodious sheds for their protection; and he would always choose to have wooden floors in the sheds for them to lie upon. He chooses to keep his different kinds of stock separately from each other: his milch cows in one yard, his young cattle in another.

With his laborers he always makes a written agreement, stipulating to board them, but furnishing no ardent spirits; and requiring of them good manners and good temper; early rising; a readiness to assist in husking in the evening, and to do any extra job which may be customary on a farm; and an attendance upon public worship in their turn.

Such were a few hasty and cursory observations which occurred to me in a short but highly gratifying visit to his interesting and instructive establishment; and I beg leave to express my grateful sense of the kindness and hospitality which I received, and the politeness with which the information I sought was communicated to me. In extent, in productiveness, or in its admirable management, I have seen no individual establishment to be compared with it. In extent, I except the magnificent farm of Mr. Wadsworth, in Genesee, which is confined to grazing, and where, a few years since, for it is some time since I had the gratification of visiting it, not a bushel of wheat was raised. As a dairy farm, likewise, that of Mr. Bussey, at Hoosic; and the grand establishment of Robert Smith, Esq., near Baltimore, where one hundred cows were soiled, are likewise before it; but I speak of it in respect to the variety of its business, cultivation, and products: and the skill, system, and success, displayed in its management.

Mr. Stimson has peculiar advantages in his abundant capital: in the profitable consumption of a large amount of his produce by means of his hotel, which is much frequented; in a most abundant supply of manure from his stables, slaughter house, piggery, and potash establishment; and in his facilities for procuring labor. But I saw no part of the process of his farming, which may not be copied by other farmers, on a smaller scale; and, especially as he does not apply a larger amount of manure to an acre than what is applied in other cases by many farmers.

The great points of difference between his own and the management of other farmers, and almost all other farmers, deserve particular attention. They consist, first, in the regular arrangement of his lots, which are all laid down upon a plan; and the management of each pursued systematically; and made matter of exact record.

Secondly, in his shallow ploughing, by which the vegetable mould is always kept in its proper place; or what he says, nature teaches is the proper place, on the surface.

Thirdly, in the incorporation of the manure with this vegetable matter, instead of burying it amongst the gravel or loam.

Fourthly, in his exact and systematic mode of planting; his corn being as regularly deposited as straight lines can make it.

Fifthly, in his economy of labor, his ploughing after breaking up the green sward, which is done by two horses, always being performed with one horse to a plough. He informed me that the last spring, with eight horses, he set eight ploughs in operation.

Sixthly, in his pursuing with each piece of land a regular rotation of crops. In this way the land is taxed but once in six years for the particular qualities in the soil, demanded by each particular crop; and by being three years in grass and clover, a new supply of vegetable matter is left upon the surface, to be turned under for its improvement, preparatory to a second rotation.

His ploughs are an improvement upon the Scotch plough, and of very easy draught. Of other utensils, I remarked none of a peculiar construction. He has a superior cider mill, and made last year from his farm five hundred barrels of cider. He has contrived a saw to go by horse power, with which he says two men, a boy, and a horse, are able to saw thirty cords of wood per day for the fire.

His men breakfast at six o'clock; dine at 12 M.; and sup when work is done at night. A large party of them were at work in the field nearly a quarter of a mile from the house, pulling flax, soon after 4 o'clock in the morning. He furnishes them a luncheon of bread and butter, or bread and cheese, in the field, at 10 o'clock, A. M. and 4 o'clock, P. M. Their drink, consisting of cider, cider and water, molasses and water, milk and water, is carried to them in the field. Above all, his farming, as well as all other of his operations, are under his constant and immediate supervision. To the inquiry, who was his foreman, his answer was, that he had no foreman; he was his own foreman. To every man was assigned his proper task, which he was expected to perform, so that the responsiblity rested upon himself alone; and under this conviction, he was the

more likely to be faithful. I quitted the place with a just admiration of its extraordinary management, and not without a deep surprise at the system, skill, care, and success, with which such heavy and various concerns were carried on, and a press of business maintained and conducted, under which ordinary men would have been overwhelmed and confounded; the cumbrous and complicated machinery making its gyrations and movements without dislocation, without friction, and without any sensible concussion or jarring of the moved or the moving body.

Extract of a letter to the Editor of the Rail Road Journal.

SWIFT CANAL BOATS—STEAM CARRIAGES ON COMMON ROADS.

When at Glasgow I visited the "Paisley" and the "Forth and Clyde" canals; and as our country is very much interested in canal navigation, some memoranda relative to the *swift passage boats* on those two canals may not be uninteresting to your readers.

First, of the "Paisley canal," which has been the longest known, and is still most successful as regards quick travelling. This canal commences at Glasgow, and goes through Paisley (eight miles distant) to Johnston, where it terminates; 12 miles long; no lock in the whole distance. The boats are of iron, of one-sixteenth of an inch thick, 70 feet long, five feet nine inches broad, and weigh 16 cwt. 14 lbs. This is the weight of the iron part alone. The total weight of the boat, including the wood work, (the cabins are of this material,) fixtures, &c. is 33 cwt.; and with 100 passengers, draws 19 inches aft and 18 inches forward. Two horses draw the boat in stages of four miles each; the pair of horses go only 12 miles per diem. There are four boats, which make six journeys each, or twenty-four journeys for the whole, each day. These boats have been running four years. They are generally full. They meet the greatest encouragement, and are very profitable to the proprietors, notwithstanding the fare is so very moderate. The charge is six pence, in the after cabin, and nine pence in the forward, to Paisley, eight miles; to Johnston, 12 miles, the charge is nine pence in the after cabin, and 12 pence in the forward cabin. The time usually employed between Glasgow and Paisley is 50 minutes, or 9⅗ miles per hour. This is the narrowest canal I ever saw, generally 30 feet wide and five feet deep. The captains of the boats on board of which I travelled, told me that on a narrow canal, such as this, the horses can pull a boat easier, *when travelling rapidly*, than on one of greater section. This, paradoxical as it may appear, is verified by the fact, that on the "Forth and Clyde" canal which is of nine feet depth, and 68 feet breadth, the boats, which are of nearly the same dimensions (68 feet long, and 5½ feet broad,) as those on the Paisley canal, are drawn by three horses, with 70 passengers on board, and yet travel at about the same velocity as on the narrower and shallower canal. I asked these captains, and also a civil engineer of some eminence, whom I met on board, returning from Johnston, how they could account for this circumstance. Their reply was as follows: on a narrow canal, say 30 or 40 feet wide, the boat passing swiftly through the water, throws the wave against the shore, which being thrown back again against the boat, raises it up, and thus propels it. The wave strikes the boat about two-thirds of its length from the bow. But if the canal were much wider, the boat would pass by before the *reflected wave* could reach the boat, and thus give it aid. I give this explanation nearly in the words of these captains, and am responsible only for the correctness of the report of what they told me. I hope this will meet the eye of our distinguished countryman, Gen. C. F. Mercer, chairman of the Committee of Internal Improvements in the House of Representatives, who advocates with so much ability *broad* and *deep* canals for transportation, as far more economical than narrow canals. I will now finish what I have to say respecting the fast travelling on the "Forth and Clyde" canal.

This canal, as I have said above, is 68 feet broad by nine feet deep, and the iron boats are 68 feet long and 5½ feet broad, and when light draw eight inches water, but with 70 passengers draw 20 inches; this is when in a state of rest—when in rapid motion they draw less. There are three horses employed to each boat, and the passengers who get into the boats at Port Dundas (Glasgow) are set down at Port Hopetown (Edinburgh) in 6¼ hours, a distance of 56 miles, or nearly nine miles per hour. It is necessary to explain to you that the passengers go only a part of the distance on the "Forth and Clyde" canal. They start from Port Dundas and go to Port Downie, (the commencement of the "Union Canal,") a distance of 24½ miles, which includes four locks. In the next half mile are eleven locks, which are avoided by the passengers being conveyed in omnibuses to boats in the "Union Canal," which carry them on a level of 31 miles to Port Hopetown (Edinburgh.) I regret that I did not take a memorandum of the cost of these iron boats, which are light and beautiful vessels, and being fearful of making a mistake I do not quote from memory. On the Lancaster, Carlisle, and Kendal canals, there are rapid boats, but not having travelled by them I do not give you any details. But if any of your readers feel an interest in the above remarks, and wish further information, I can with facility procure it, and will with pleasure communicate it to you.

Since my return from the north I have called on Mr. Hancock, in company with Mr. T., one of the engineers of the Boston and Providence Railway. We found that for the last two months the "Era" and the "Autopsy" have discontinued running, owing to the absence of Mr. Hancock in Ireland, whither he went with the "Era," for the purpose of ascertaining if he could profitably introduce locomotives on the roads of that country. He is now returned to London, and will, I am informed, recommence running these two engines on the metropolitan roads in a few days. Mr. T. and I also went to see Mr. Russell's steam carriage, recently arrived from Glasgow, which will in a few days ply regularly, in conjunction with others of this gentleman's make, between Hyde Park Corner, and Hammersmith (the commencement of the great western road out of London.) This carriage is by far the most tasteful of all the steam carriages I have seen. It is built exactly like the stage coaches of this country, except the dimensions are larger. The whole of the ma-

chinery is in the hind boot. The water and the coke are in a *tender*, or separate carriage on two wheels, behind the locomotive. This steam coach will carry six inside passengers sitting *viz-a-viz*, 14 outside on the roof, and six on the tender; total, 26 passengers. From the favorable terms in which I have heard Mr. Russell's engine spoken of, both here and in Glasgow, I feel a great curiosity to ride on it, and I will take advantage of the first opportunity to do so, and will report to you respecting it, as well as others which will no doubt be introduced as the spring advances. You may inquire, why did not Mr. R. remain in Glasgow? I will reply in nearly the words of the gentleman who showed us this carriage. He said the prejudice against it was great, in consequence of the unfortunate accident by which 12 or 13 passengers were killed or wounded; that it was expedient to come to a distant part of the country. He told us, that for several months this engine plied between Glasgow and Paisley, and performed in a manner to give entire satisfaction; and in consequence, the stage coach proprietors and trustees of the road were alarmed lest this and others would gain so much in public estimation as to become regular coaches. They therefore resolved to drive it off, if possible. This they accomplished by *picking up* the turnpike, and putting fresh metal down in unusual and extraordinary quantities. Notwithstanding the road was made almost impassable, the engine was still continued, and plied regularly several times each day for a whole month, and excited the admiration of all intelligent persons, that it *could* overcome such difficulties. It however was finally injured by being driven for so long a time over a *road so much worse than it was constructed for*, and one of the hind wheels getting into a hole (made by order of the turnpike proprietors,) it broke, and the carriage tumbled to the ground; four or five persons were killed, and eight or nine others seriously maimed and wounded. But none of them were hurt from the explosion of the engine, or the escape of steam, but from being thrown with great violence against the rough, new mettled road—the same kind of injury as would be received from a common stage coach breaking one of its wheels when travelling rapidly. I am informed that an action is brought by the owners of the steam carriage, as well as by several of the survivors and the friends of the deceased, killed by this melancholy event, against the road company, for obstructing the King's highway, and causing the injury and death of a number of persons, besides loss of property. Sanguine hopes are entertained that the guilty will be severely punished.

I forgot to tell you above, that the swell on the two canals, caused by the quick passage of the boats, is very inconsiderable.

I am, very respectfully,

Your obedient servant,

GERARD RALSTON.

P. S. The demand for railway locomotives is very great. I am sending nine to different parts of the United States, and both Mr. Robert Stephenson and Mr. Bury have orders to give them full employment for several months to come.

MEMOIR ON THE MAKING OF WINE IN THE CANTON OF MARCILLAC.

By M. CHARLES GIROU DE BUZAREINGUES.

Translated for the Farmers' Register, from the *Annales de l'Agriculture Francaise.*

The vintages which continue about three weeks, generally take place in the course of October. More intent upon the quantity than the quality, the proprietor bestows little care upon gathering only the ripe and sound grapes. The vintage is seldom interrupted, or suspended, to wait for the perfect maturity of the fruit; in from fifteen to twenty days the whole is finished in the vale of Marcillac, and the vintage scarcely lasts four or five days in the same vineyard. It is not thus that the work is performed in the vine lands which furnish the good qualities of Bourdeaux wine: there they pick constantly, and the vintage continues for one or two months. No great advantages, it is true, would be obtained at first by similar care in the vale of Marcillac, but in the end it would be found not wholly useless, for complete ripeness was never yet a defect.

The vintager receives for hire 20 centimes a day, and his food, representing a value of 50 centimes.

The grapes are carried from the vineyard to the vat in double panniers, which are placed upon cushions of goat skin, of a triangular form, with the angles rounded. Seen underneath, these cushions represent, towards the sharpest of their angles, a cap or hood to receive the top of the head, and towards the opposite side two small cushions near together, designed to protect the shoulders on which the two divisions of the pannier rest. The head of the porter being placed between these divisions, the pannier is prevented from slipping back by a band of osier attached to its two divisions, and against which the anterior angle of the cushion presses. This pannier, which together with the cushion, weighs five or six kilogrammes, contains from 40 to 45 kilogrammes of grapes.

It is wonderful to see the porters, under this heavy burden, descend at a rapid pace, with the aid of a long staff, from the top to the bottom of the vineyards or climb up them by goat paths, and often traverse more than half a league without relaxing their speed.

If we judge of them by their gait when they return unloaded, to the vineyard, they do not then feel so much the necessity of hurrying themselves.

Their stature generally corresponds with the muscular force required by their employment, which is at once laborious and dangerous.

The number of porters is determined by the abundance of the crop and the distance of the vineyard from the cellar. When this distance is great, oxen are used to haul the grapes which, in this case, are put into a large tub placed upon a cart. The porters then, have only to carry the grapes from the vineyard to this tub which is generally not far distant; their task, however, is not therefore lessened, for they are fewer and more frequently obliged to go up and down the steep paths of the vineyard, the most dangerous and most difficult part of their work. Their wages and food agree with their service; they receive, per day, from one franc twenty-five centimes to one franc fifty centimes, and they make eight or

nine meals, which, together, are worth two francs at least. We are, at first, no less astonished at their digestive capacity than at their muscular powers; but the one is soon explained by the other.

When the grapes reach the cellar they are poured, generally without being stripped from the clusters, upon a table pierced with holes, surrounded by high raised sides and furnished with a trap-door. This sort of chest is fixed upon handles, by the help of which it is carried like a hand-barrow, and placed horizontally on the vat; it is called *gabio*, which signifies a cage.

A man, who receives the name of *gabrazre*, because he works in the *gabio*, enters it with naked feet and legs, and tramples the grapes. When the operation is ended, he opens the trap-door and throws into the vat whatever has not already fallen through the holes of the cage.

This trampling is not practised by all the owners of vineyards; there are some who pour the grapes at once into the vat, where they are afterwards crushed as well as their situation will permit.

Some proprietors strip a portion of their grapes from the clusters. My honorable friend, M. de Cabnères performs this operation upon all his. He has a double bottom fixed above the grapes which keeps the *æne* beneath the surface of the liquid; and a cover or lid placed and luted upon the vat prevents all evaporation. The results obtained by this intelligent proprietor establish beyond a doubt, that the wines of Marcillac might take their place among the good wines of France, if in the vine lands of this name the culture of the vine and the making of the wine were directed by men like him.

The question, however, whether it is proper to strip or not to strip the grapes from their clusters cannot be determined by the success of a single individual in a tract composed of such a variety of grapes, soils, and exposures. The introduction of the clusters whole, facilitates fermentation, and, by the principles which it furnishes to the wine, gives it sprightliness, renders it piquant and lessens its tendency to become thick or oily, *(tourner au gras.)* In these respects it becomes useful, when without it the wine would be very weak and tasteless, and could not be preserved without difficulty; and consequently it is proper on the hills where a sweetish taste predominates, and from which only a wine of very weak quality can be expected. But it is not the same with the crops in which *aroma* and sugar abound, at least sufficiently to enable us to calculate upon a generous wine, agreeable to drink, and easy to be kept by the ordinary processes of racking, [*mutage*] and fining. In such situations it is proper to get rid of the astringent principle. It may then be of advantage in one place to strip all the grapes from the clusters, in another to strip only a part of them, and in a third not to strip any; and each person ought, in this particular, to pursue the lessons of experience, taking care to modify his practice when the circumstances under which it was established are no longer the same. It might have been proper formerly to strip off the grapes of a particular vineyard when it was planted in *menu* and received but little manure, while this would no longer suit since it is planted in *moissagues*, in *maural*, in *canut*, or other varieties which produce only flat wines and since it receives much manure.

The fermentation generally goes on in an open vessel, whence it follows, first, that the *must* does not contribute at all, or it contributes very little by its own oxygen, to the formation of the carbonic acid gas, and that a less quantity of this gas is absorbed by the wine; secondly, that the *must* loses more of its carbon; that its hydrogen and oxygen may be united in greater quantity to form water; that alcohol is produced in less abundance; that the evaporation of this as well as of water is greater, that, in fine, there is less wine, and that this wine is of weaker quality.

The grapes generally remain ten days in the vat: the duration of this stay is abridged or prolonged according as the weather is warm or cold, and the ripeness of the grapes more or less complete. When, from the abundance of the crops and the want of vats, it has been necessary to remove the wine before its fermentation was entirely over, the result has been a better wine, but more disposed to become thick, doubtless because there remained in it a greater amount of carbon united with its mucilage. Here perhaps the unsuitableness of habit is felt in a change; because it was right to keep the wine ten days in the vat, when the *menu* containing a great deal of sugar predominated in the vineyards, it is thought proper still to give the same time when other varieties which produce grapes less sweet and weak wines have been substituted for the *menu*.

Some wine-makers, however, take their wine from the vat before the tumultuous fermentation is entirely over, and they applaud the practice; as their proceeding is rational I can easily credit their success.

The fermentation is often facilitated by pouring into the vat a certain quantity of *must* boiling hot; but this good method is proscribed by the prejudices of certain makers who consider wine thus made as adulterated.

During the fermentation a naked man enters once a day into the vat, and returns towards the bottom the stems and woody fibres of the clusters *(rafle)* which the fermentation has raised to the surface; he crushes, besides, the grapes when they have not been trampled in the *cage*. This operation becomes dangerous if the vat is only half full. The danger and the accidents are increased by the intoxication of the persons who are exposed to them: in 1831, an imprudent vine-dresser perished in a vat, in a state of asphyxia.

The temperature in the vat rises in the course of the fermentation to 25° or 26°, (centigrade,) that of the store-house being 15° or 16°.

When the fermentation is over, the wine is drawn off through a hole, made for that purpose at the bottom of the vat, and kept free from the obstruction of the *marc* by tiles, vine-branches, or other articles. On some estates the cellar is under the store-house, and the wine flows of itself, conducted by tubes, into the casks which have been cleansed and prepared beforehand for its reception.

When the wine has ceased to flow and no more remains in the vat the *marc* is taken out and subjected to the action of the press, an enormous square beam of oak fixed as a lever of the second order, on which the power is applied by means of a screw, of which it becomes the nut, and which

three men turn by the help of three other levers: this screw tends to press together the thick and heavy plank of the table on which the *marc* is placed.

This wine is put away separately, or mixed with the first to give it a deeper color.

Wishing to have the means of increasing this depth of color, some proprietors cultivate the variety called *teinturier* the whole merit of which is to produce a wine as black as ink.

The great value attached to the coloring of the wine proceeds doubtless from the preference given by *the trade* to that which is highest colored, and this preference is itself founded in part perhaps on the capability of the high colored wines to receive, without its appearing, at least, to the eye, a certain quantity of water.

Yet, is it really indifferent whether the wine contain much of the coloring principle or be almost deprived of it? On this question it may be observed, that wine as it acquires age, loses its color and improves in quality, and besides, that many poor wines are very high colored, but that would not prove that it is useless to wine to have color at first: to determine this question it is proper to collect all the facts, reserving the endeavor to ascertain the cause of them afterwards. Wines deprived of this principle, when first made, easily become thick or acid, and the more certainly the more completely they are deprived of it. When wine becomes thick it loses its alcohol and acquires oil: it becomes acid only by contact with the air. It ceases to be liable to turn acid when it is deprived of that mucilage, which some chemists have called *extractive*, considering it as a distinct substance: by this mucilage also wine is capable of becoming thick; the most mucilaginous wines are the most subject to this fault.

The more coloring principle there is in the grapes, the more tartar also is there in the wine. The mucilage, the tartar, and the coloring principle are precipitated together, and form the lees. The mucilage is not precipitated in white wines, at least it is not precipitated either so promptly or so abundantly as in red wines; yet in the first as well as in the last, the tartar is precipitated, whence it may be concluded that the mucilage is precipitated by the coloring principle. In separating from the lees, the wine does not lose its alcohol, and becomes less and less capable of turning thick or acid.

These facts prove that the coloring principle is useful to the preservation of the wine so long as the mucilage is not precipitated; they enable us, besides, if I am not mistaken, to understand more easily, some phenomena which are displayed in the wine, which depend in some measure upon this principle, and which explain, at least, in what manner the color may contribute to the preservation of the wine.

When, in the spring, the mucilage undergoes a new fermentation, the carbonated hydrogen which is disengaged decomposes a part of the alcohol, and is combined with its constituents in the proportions requisite to make oil; the whole quantity of alcohol is diminished, the mucilage puts on an oily appearance, and the wine has become thick. The coloring principle, which is itself without action on the alcohol, becomes nevertheless an obstacle to its decomposition, by fixing, in the mucilage, to which it is capable of being united, and which can even dissolve it, the tartar which accompanies it, and which tending, as well as sugar, to form alcohol, ought to prevent its decomposition. By being precipitated to the bottom of the casks, carried down by the coloring principle and the tartar, the mucilage ceases to be in contact with the air: it has scarcely any fermentation, and the acidification of the wine is more difficult. I submit to the judgement of chemists this theory, incomplete without doubt, false perhaps, and which I offer only with very great and very well founded diffidence.

When no more wine can be produced by the action of the press, a colored liquid is obtained by watering the *marc* and pressing it again: this makes the *piquette* which is the ordinary drink of the wine-dressers when they are not supplied by the proprietor.

Every year at the commencement of the spring, prudent proprietors rack their wine after having fumigated the casks destined to receive it by burning a match made of cloth dipped in sulphur, four *centimetres* wide by two in length, for each *pipe* in quantity. The cask in which the match has been burned is left shut close for five days; sometimes aromatic substances are added to the sulphur which forms the match, whence results a perfumed flavor, an artificial *bouquet* which is not equally agreeable to all amateurs. Fining the wine with the whites of eggs is practised by only a small number of economical and careful proprietors.

The wine of Marcillac, it is said, cannot bear transportation and keep long; this is a mistake. I have drank it at Paris very good, and four or five years old, coming from the hill of *Gradels*. The wine of the hill of *Cruou*, when made with selection and care, can keep for twenty years, the ordinary term of the ancient Falernian. On this same hill a wine is obtained worth from two to three hundred francs the hectolitre. But an old custom decides peremptorily one of these questions. In the years when the best wine was made, the inhabitants of the place who were in the most easy circumstances, formerly filled a cask with it, from which, after four or five years, they drew successively what they required for their consumption, and replaced it afterwards with new wine: this cask became thus inexhaustible, and was called the *tonneau perpétuel*. Would this custom have existed if the wine would not keep?

If however the wine of Marcillac has lost in general, something of its old quality, it is, doubtless, because the cultivators have given up, as not sufficiently productive, the plants with grapes containing much saccharine matter, but small and few, to substitute for them vines with grapes less sweet, but large and numerous; and besides because they neglect the means to prevent the wine from becoming thick or acid, such as racking, [*mutage*,] fining, and when necessary the addition of a little sugar or boiled *must*, when the weather has been rainy before or during the vintage, and when the wine is weak.

From the various qualities of its soil, and the different temperatures of its climate, from the aclivity of its inhabitants, from its proximity to lands cultivated in grain, and the facility of obtaining from them the dung of sheep, preferable in all respects, to the manure from half rotted

dunghills, mouldy and sometimes of an infectious smell, the canton of Marcillac is capable of producing various qualities of very good wine, the best of which would yield in nothing to the finest wines of France. That the art of wine-making may reach this high degree of perfection, only three things are required, instruction, inclination and capital. Are we advancing towards a future which permits us to hope that they will at last be found united? I dare not on this question affirm any thing, except that this future will be realized only inasmuch as there shall be great profits in attending to the quality, and as this attention shall be excited by powerful examples; or in other words, it will not be realized till the contrary of what now exists shall happen.

Among the obstacles to perfection in wine-making may be reckoned, the temperature of the cellars, most of which, like the vineyards, have a southern aspect; the retail trade, which leaves the wine of the casks which have been broached, exposed for a long time to the contact of the air; the terrible prejudice that all wine managed by a new process is an adulterated wine, which will produce deleterious effects on health, and which should consequently be distrusted, however agreeable may be its taste; the substitutions by which the carriers, to the prejudice of the quality, know how to render their unfaithfulness undiscoverable by measure; a fraud of old date which became in 1550 the object of a severe sentence by which it has not been abolished.

The wine of Marcillac, the trade in which scarcely extends beyond the limits of the department of Aveyron, will soon be indebted for a great market to the immense and magnificent establishment of Decaze-Ville, situated in a canton contiguous to that of Marcillac, and near which will be soon collected a people of smiths: to these, often thirsty, this wine will appear much more agreeable and more wholesome than the fiery wines of Languedoc. It is thus that great enterprises give life to the countries that become the theatres of them: honor to those who undertake them with all the means which presage their success.

FOUR-FIELD FALLOW SYSTEM, AS OPPOSED TO THE THREE-FIELD ROTATION,

Being a Cursory Review of an article No. 9, Far. Reg. (Vol. I.,) under the signature of Wm. H. Roy, Esq. in support of the latter.

To the Editor of the Farmers' Register.

I sing the tillage old Virginia knows,
Which cheats with hope the husbandman who sows;
Not such as Maro sung in deathless strains,
To piping shepherds and Italian swains.
With "crops *immense*" no "barn here ever cracks,"
The wheat comes always badly from the stacks,
The corn falls ever "most immensely" short
Of vague conjecture, or of false report.
* * * * * * * * *
Myself a farmer of that sort i'fegs,
Who rip the goose to get the golden eggs.
* * * * * * * * *
Who rear no clover on a thirsty soil,
For why?—it grows not to reward their toil:
Who strew no gypsum, but absurdly rail,
And swear 'tis nothing to the old cowtail.
These are their follies—these their crying sins,
Despite the pamphlet of the enthusiast Binns;
I own the charge and cry myself, peccavi:
I read, but follow not, Sir Humphrey Davy.

Old Virginia Georgics.

In reviewing the causes which have operated to retard the agricultural advancement of Lower Virginia, it has long been the settled conviction of my own mind, that the most extensive and fatal, if not that of paramount importance to all others, was to be found in the *odious* three-field system. It is still a question of doubtful solution, to which of the two principles mankind have alternately yielded the most absolute dominion; that of the sanctity of time, and custom, on the one hand—or, of an inordinate spirit of innovation on the other. While the latter is decidedly the master spirit of the age, and has extended its influence to all other classes of the community—even that of the agricultural—the former still retains and exercises its ancient and uncontrolled supremacy. In no department of the arts, or indeed of the sciences, (for to that distinction may agriculture now confidently aspire,) have greater improvements been effected than in the theory, philosophy, and practice of farming. Chemistry has shed a flood of light over the whole subject, illustrating its principles, and establishing its laws, on the sure basis of scientific truths—improvements of acknowledged practical utility are daily made; errors both in principle and practice exposed. But yet by the great mass of our community, they are received with distrust, denounced as innovations, or passed unheeded, as the illusions of the theorist; and they still plod on in the "good old way" to ruin—with the same pertinaceous adherence, and no better reasons, than did the old Dutch settlers of Kinderhook, because forsooth, their fathers had done so before them. To the influence of this principle are we indebted for that system, the defects of which, it is my present purpose to expose. Looking as I have done to the explosion of this, and the adoption of some better system, as the only hope for any extensive, or permanent improvement in our agricultural condition, I had early designed making it the subject of a communication, if for no other purpose than that of inviting others more competent than myself to the task.

In this design however, I happily found myself anticipated, and after the two able, and, to my mind, conclusive articles of Messrs. Selden and Carter, considered the whole ground as completely occupied, and that more, neither could or need be said. Presenting as they did, a plain and unquestionable record of practical results, read, discussed, and admitted, as they generally were, I had anticipated from them, the most happy effects—all things, in fact, seemed to afford the most favorable auguries. Through the joint influence of your Essay and your Register, a spirit of inquiry had been aroused—better hopes had been inspired—the *vis inertiæ*, so long felt, removed, and a new impulse every where given to the work of improvement. In the transforming effects of calcareous manure, an approximation seemed really made to the long sought principles of the alchemist, and in the fond hopes of the farmer, were again amusingly revived the bright visions, and early dreams of that visionary—a new era had indeed arisen—the revolution so important to be effected, seemed at least in progress of successful accomplishment, and the future in bright perspective, broke forth in all the beauty of renovated nature: our worn out fields, and poverty stricken herds, (the too faithful moral portraiture of our condition) had assumed a new aspect, and already

teemed with life, luxuriance and comfort. But, alas! this was but the day-dream of a too sanguine imagination! A sad reality, in bitter mockery, every where meets the eye.

Among the advocates of the three-field rotation, I regret to find my friend and neighbor, Wm. H. Roy, Esq., a gentleman whose sound and practical views, on all subjects, and whose success as a farmer, justly entitle his opinions to much weight and deference. I cannot better effect the object of this communication, than by glancing at a few of the arguments urged by him, in the article above referred to.

The first position assumed is, "that ours is not a wheat growing country;" and the inference thence deduced, that Indian corn should be our primary crop. When the major proposition is established, I will admit the minor. But by what process of reasoning does he arrive at this conclusion? By "observation, and the experience of years, which have convinced him, that the wheat crop is precarious, and subject to numerous casualties, which no skill or industry can remedy." Let us not, however, take the fact, without investigating the cause. He proceeds, "it not unfrequently happens in the spring, when the wheat is in bloom and promises an abundant yield, that the hopes of the farmer are blasted by an easterly storm. Indian corn is the only crop on which he can with safety rely." Would it be right then, he asks, "to adopt a system which would render wheat our primary crop?" Would it be right, (if I may be permitted to answer this question by asking another,) to persist in a system, which year after year, but mocks us with disappointment? I do not maintain that ours is a wheat growing country—nor, consequently, that wheat should be made our primary crop. But I do maintain, that the converse has not been established—that our entire system is opposed to its success—that its cultivation should either be abandoned, or that, to the extent cultivated, recourse should be had to some more ameliorating system, and that the very admission of the fact of "uncertainty," is the strongest possible argument in support of this. Nor is the conclusion drawn from our want of success, a legitimate one. By parity of reasoning it might be shown, that James River, and other sections of country, (for there this system has been repeatedly tried, and with no better success,) were not wheat growing regions. Can it then be expected, that a system which has entirely failed in a location naturally adapted, both by soil and climate, to the production of wheat, should not fail in one acknowledged to be defective in both? And does not the fact of its "being uncertain and subject to numerous casualties," give it an additional claim to the fostering care of the most judicious and approved cultivation? But it is "by the easterly storms that the hopes of our farmers are so frequently blasted." Here we join issue—now I do not imagine, that clover fallow is to afford an effectual protection against this evil; but I do suppose, that it would go very far in counteracting its effects. I take it for granted, that whatever contributes most to the health and strength of a plant, contributes at the same time most to the probabilities of its success. No one I suppose would hesitate to admit, that a healthy and vigorous crop is, in the first place, much less liable to disease of any kind, than a feeble half starved one; and that if attacked, it would successfully resist disasters, to which the latter would fall a ready victim. As well might we compare the ability of the nursed up invalid to resist the winter's blast, with that of the hardy nursling of the storm.

"I will concede," says the writer, "that land will improve faster under the four-field system, &c." An important concession, truly—involving, I conceive, the whole matter in controversy. Land constitutes the principal capital, and its improvement I had supposed the principal object of every farmer. To this end are all our efforts directed, and by its subserviency to this purpose, do we pronounce upon the value of every system. Of what importance are a few abundant crops, provided they leave us in return, an impoverished and worn out soil? Let us but make our land rich—adopt that system as the best which most readily effects it, and we may then cultivate as either taste, interest, or pleasure dictates.

"Indian corn," again proceeds our author, "is the only crop on which we can with safety rely. In a country not well adapted to hay, it furnishes us with the means of supporting stock, and of manuring extensively." I admit the justice of the eulogium, and have certainly no disposition to quarrel with our best friend. With us it does indeed constitute the staff of life. It is with the system alone that I am at war; and to that I cannot concede the superiority claimed. That loss in the corn crop will be sustained for a year or two, is probable; but that as soon as in full operation, and the effects of the system are fully felt, that that loss will be more than compensated, and that one-fourth of the same farm, will produce as much as one-third had previously done, there can be but little question. Upon this hypothesis, (and it is one which may be sustained by a reference to the actual results of farms under the two different systems,) no diminution of the corn crop being sustained, it follows of course, that there can be no diminution of material, either for manure, or the support of stock. On the contrary, from the increase, (say the three-fold production of the wheat crop) the material for both purposes is greatly augmented, in the articles of wheat straw, clover hay, pasturage, &c.; and these, together with the increase of product, may be struck, as a fair balance, in favor of the fallow system. It is thus under this system that wheat becomes the primary crop, not by any actual diminution of the corn crop, but by the increased production of the former; and surely to its priority on such terms, none of us can object.

"But," says the writer under consideration, "after all, facts afford the best arguments." "I have noticed with minuteness and attention, the experiments of several of my neighbors, and will give you the results. One divided his farm into four-fields, and cultivated them successively in corn. His land, judging from the growth of vegetable matter, evidently improved—yet, his corn crops declined, and his wheat crops were generally destroyed by insects. He was compelled to return to the three-field system." The instance here referred to, affords a fair specimen, and the results a fair commentary on the four-field system, as pursued among us. I beg leave to state, that it was not the four-field fallow system now in vogue, as known and practised on James River and elsewhere, but that introduced by the late Col. John

Taylor, of Caroline—in other words, a turning out for four years in succession, with a certain prospect at that time, of an abundant crop of pine bushes, broom straw, and of every noxious weed, with which the iniquities of our first parents were visited. "Another gentleman, possessing more enterprise than his neighbors generally, divided his farm into five-fields. His crops of corn and small grain, have retrograded. He has had several crops of wheat on his fallow fields, which promised a most abundant harvest; and yet from insects, or storms, or some other casualties, he has always been disappointed in his expected harvest. This last gentleman possesses all the requisite skill and and industry to insure success. He will, I doubt not, although he is unwilling to admit it, yet return to the despised three-field system." Really I had expected more magnanimity! Such enterprise, skill, and industry, deserved a better fate! But, alas! who can contend against fortune —against the combined powers of insects, storms, and other casualities? He has, in truth, returned to that despised system. "Another neighbor has been cultivating his farm in four-fields for several years. His small grain crops increased; but latterly a great change has taken place—his barley crop (his principal reliance) has gradually dwindled away; until this year, he may be said to have sowed himself out of seed—and fairly abandoned the crop." The gentleman here alluded to, deserves to be particularly mentioned, as the first who had the boldness to set up for himself, and introduce the new system among us. His success for several years was signal—so much so, as to attract the attention of all, and to induce a few others, partially and cautiously, to follow his example. The production of his farm under this system, I have no hesitation in saying, has been double that under the former system, and greater by far than that of any other farm of the same size and equal fertility. I allude to the grain crop; nor am I aware, nor do I believe, that any diminution has been sustained in the corn crop. A series of disasters, it is true, he has shared in common with others—Mr. R., himself, not excepted—but under all circumstances, his crops have been better than any in the neighborhood.* "I will cite you another case—a farmer very near me, a particular friend, &c., divided his farm into four fields. He has made great exertions to improve it by manure, rest, &c., and his success is very flattering, &c.—yet, I think, he is nearly convinced that the four-field fallow system will not answer, and that he will speedily abandon it. His small grain crops have never come up to their promise, and the wild onion is gaining rapidly on him."

For that gentleman, I take it upon myself to say, that although his crops have not been adequate to his expectations, yet, that his confidence is undiminished, and his perseverance unsubdued. To the onion he pleads guilty. True it is, that at various times, in consequence of not grazing, it has taken almost entire possession; but yet, after a doubtful and protracted conflict, his crops, both of wheat and barley, (through the redeeming virtue of fallow) have invariably obtained the mastery. The wild onion, I will here take occasion to add, has almost entirely given way; and to perseverance in the system, he confidently looks for its entire eradication. I will add, that while clover constitutes the chief excellency, and an indispensable part of the fallow system, yet, that in none of the instances above referred to, was recourse had to it, and that success ought rather to have been a matter of surprise, than of reasonable expectation.

In concluding this hasty review, I cannot but advert to the silence, and becoming modesty, with which he passes by the success of his own experiments. I submit it to his own candor to say, if in the several instances in which he has tried fallow, he has not more than doubled, if not trebled, the production of the same land, wheat succeeding corn. In the last instance, on a lot of several acres, a crop of 25 bushels per acre was produced. Now, if one or more acres, under a certain system, be capable of producing a certain crop—why may not a greater number under the same system, and similar circumstances, produce a similar crop? On the ordinary principles of induction, may I not then conclude, that the same system *in extenso* would be attended with the same results; and (reasoning *a priori*) derive an additional argument in support of the position assumed —that want of success is not so much attributable to soil, or climate, as defect of system.

I cannot in stronger terms express my unqualified condemnation of the three-shift rotation, than by adopting the words of that distinguished agriculturalist, Col. Taylor of Caroline. "As a system," says he, "for extorting crops from the earth, it is precisely similar to the rack for extorting truth from the sufferer. It stretches, tortures, mangles, obtains but little of its object, and half, or quite kills its victim. This three-shift system has only one merit—honesty. In theory, it promises to kill our land; in practice, it fulfils its promise." With him I cannot accord to it, even the merit of honesty. It professes, in fact, to improve, and under the imposing guise of friendship, inflicts the deadly wound.

A chief objection to the system, consists in its hostility to the cultivation of grass; and a capital defect growing out of it, among our farmers, is that of an entire reliance on artificial putrescent manure, to the neglect of the more important auxiliaries, of green succulent vegetable crops. Among these, red clover claims a decided pre-eminence. Yet, strange to tell, while in other sections it has been regarded as the most important, if not the only real efficient agent; with us it has been entirely neglected; at least with reference to the improvement of land. I know of nothing which would be regarded with more incredulity, than the assertion that a good crop of clover was equal to a plentiful dressing of stable manure—yet we have the authority of Messrs. Carter, Selden and others, for the fact.

An unfortunate impression prevails, that our lands are not adapted to clover. I do not assert that they possess that peculiar aptitude for it, which characterizes the James River and mountain country; but that it can be cultivated to great advantage even on our worst soils, improved to a

*This statement, however contradictory, is not designed to impugn the correctness of that of my friend R. It is given as a mere matter of opinion, on a subject of fair difference, and in the absence of any certain data.

certain degree, (and with us such improvement is always pre-supposed) admits of but little question.

The greatest obstacle with which we have to contend, arises, I have long thought, from the fact, that from the neglect of the cultivated grasses, our lands have become so completely pre-occupied by noxious weeds and other grasses, as to afford in the contest for possession, a very undue advantage to these, the primitive and rightful tenants.

The efficacy of plaster, in consequence of our contiguity to the sea, and the supposed neutralizing effects of saline atmosphere, has also been much questioned. So far as experiments have been made, their results have been so equivocal and unsatisfactory, as to leave the subject still entirely problematical. The use and value of ashes, calcareous manure, &c., in counteracting this effect, (as suggested by yourself and others,) is a subject of interesting inquiry, well worthy the attention both of the practical and scientific agriculturalist.

But, say the advocates of the opposite system, what obstacle is there to the cultivation of clover under the three-field rotation, with the addition of a standing pasture? To this I will simply object, that it is a begging of the question—that it constitutes no part of the system—that clover is principally valuable as a fallow crop for wheat—that corn requires a clean preparation, and (as generally admitted,) seldom succeeds on a clover lay. It is in the application of manure, that the beauty of the system is particularly seen. Manure is to the farmer, what principal is to the money lender. The value of both depend upon the activity with which it is employed, and the return annually made. If it is a sound principle with the one, to collect punctually every year his interest and add it to his principal, it must be a bad one for the other to await a precarious return but once in three years. There is nothing so discouraging to a farmer, as to find at the expiration of that time, all his labor lost, (as is the case in most of our soils,) and nothing but an increased necessity for renewed exertion. If his manure is to be evaporated and lost, why not derive the benefit of it to a crop. Here the clover crop interposes its kind offices. By this it is taken up, secured from loss, held in trust for the benefit of the land, and in the admirable economy of nature, returned in a new and modified form to the purposes of its own support.

The value of clover admitted, and the practicability of its cultivation established, the superiority of the four-field fallow system must be conceded—three-fourths of your land being in active production, and the remaining portion under a course of regular and progressive improvement. The limits assigned to an article like this, (and which I have already greatly transcended,) forbid me farther to enlarge on the many other advantages which might here be mentioned. Facts, however, "after all afford the strongest arguments." Compare then those sections in which the two systems have been respectively pursued—point out the individual instances of success under each—show me the estate under the three-field system, which, either in its profits, or the rapidity of its improvement, can compare with that of Woodstock, Westover, Shirly—raised as if by the magic of a system, from the ruin and desolation to which they were reduced, by the scourging effects of an opposite course. We have among us intelligence, energy, and enterprise—no where are the evidences of these more obvious—neatness, order, good cultivation, and general good management are striking features—and challenge from every observer a proud contrast, with that of most other sections of country. But yet our lands, with few exceptions, are scarcely stationary—our citizens, worn down with toil, and disappointed in their expectations, are seeking in the "far west," the land of hope and promise, and leaving to ruin and abandonment, the neglected fields and deserted homes of their fathers. Let others seek in the romance of their feelings, the wildness, vigor, and untamed luxuriance of the west. Give me, (and would that I could inspire others with the same hallowed feeling,) give me, the endearments of early life, the social enjoyments, and solid comforts of the old states, pressing rapidly onward as they are, in their career of improvement, and destined as they soon must be, to rival even the old world, in all the improvements and refined elegancies of life.

W. T. T.

Gloucester County, April, 1835.

FREDERICK AND JEFFERSON COUNTIES—REMARKS ON THE CHARACTER OF THE COUNTRY, AND THE SYSTEM OF CULTIVATION.

To the Editor of the Farmers' Register.

Most of the readers of the Farmers' Register have heard much, and few comparatively have seen any thing of the Valley of Virginia, that par of it especially which borders upon the Shenandoah and the Potomac rivers. Some remarks upon the character of the country, the system of cultivation, &c. may not be unacceptable to the pub lic. No part of Virginia has been improved to so great an extent, and with so great rapidity, as the region of country which I have mentioned.

The best portion of the county of Frederick lies to the east of the Opequon and borders upon the Shenandoah river; it joins the beautiful county of Jefferson, which through its whole extent, has the same river as its eastern border, and the Potomac river as its northern limit. The same vein of land runs through the upper and better portion of the state of Maryland, and through Pennsylvania to Philadelphia, embracing in its course, the justly celebrated counties of Cumberland, Lancaster, York, and many others. My remarks are intended to apply to the part of the county of Frederick above mentioned, and to the county of Jefferson, because with them I am familiar. The extraordinary point of improvement, fertility, and value to which the Pennsylvania portion of the valley has attained, has been produced by the absence of slavery, and the consequent division and subdivision of the land into farms of from ten to one hundred acres. Of course we cap enter neither into comparison nor competition with them in the absence of the cause of improvement to which I have referred. I believe however, that the portion of Virginia alluded to, is in no respect inferior, in natural fertility, to any part of Pennsylvania.

Our lands are very much broken with ledges of limestone rock, causing great labor and expense in their cultivation—though this inconvenience is very unequally felt in different places, diminishing generally as we approach the rivers. The coun-

try is for the most part abundantly supplied with limestone streams—though we have reason to fear that this great advantage is lessening every year from summer droughts. Certain it is that both the springs and streams flowing from them are much less copious than they have been within the recollection of many living witnesses. In fact, the great enemy with which we have to contend is drought. Our lands burn easily from the great quantity of limestone at and near the surface, and hence our cropping is precarious, except upon well improved lands. With all of these disadvantages, (and I may add to them a harsh and most capricious climate) agriculture is in a prosperous condition, and the price of lands immensely high. It will be recollected that about the year 1817 lands had attained a price totally disproportioned to their productive value—from sixty to eighty dollars per acre being the current rate. The reaction, which afterwards followed, reduced them as much below as they had been above their real value. One of the best farms in Jefferson county sold under my own observation, for twenty dollars per acre. It has now settled down at a mean between the two extremes, and the present value of good land may be fairly stated at from thirty to forty dollars.

Clover and plaster of Paris are here, as elsewhere, the instruments of improvement. Soon after the introduction of plaster among us, our most energetic farmers used it with great effect; and judging that the benefit would be proportioned to the quantity used, it was laid on with a lavish hand. Hence it resulted that the land became, as it was termed, "plaster sick," and no continuing benefit seeming to follow, it was in a great measure abandoned. The circumstance was eagerly seized upon by those averse to the expenditure of money upon their lands, to justify their neglect of its use altogether. As soon however, as the effects of its former use had worn off from the lands which had been benefited by it, it was discovered that the clover ceased to grow luxuriantly, and of consequence that there was an end of improvement, most sensibly felt in diminished productiveness. It was therefore again brought into free use, and is now in as high favor as ever, with a much better understanding of its properties. No farmer now thinks of using clover without plaster, it being a concession, that it is entirely dependent upon this valuable auxiliary for its efficacy.

Manuring is also extended as far as practicable by every one—though the manner of applying it is various. Many persons feed their stock through the winter upon the hills and galled spots in the open fields. Others pen them near the straw-ricks, and leave the manure to be afterwards hauled upon the field where it may be wanted; while others (more particularly small farmers) adopt the old system of bringing every thing to the barn-yard. No attention is paid to mixing manures for compost: that which is in order is usually put upon the corn land in the spring, while the rough or only partly rotted is reserved for fallow in the autumn. The old practice of ploughing in the manure generally prevails, though many of us have been induced by what we have read in the Farmers' Register, and elsewhere, to try the top-dressing, and I think the latter plan is growing into favor. While I do not question its adaptation to the porous and sandy soils of the lower country, I have apprehended great loss from evaporation in our stiff, unyielding lands. It is a question of great importance, and it is hoped that continued discussion and experiment may lead to some satisfactory solution.

Our staples are, as you know, wheat and corn; rye and oats are made for home consumption. The market for corn has been confined to the neighborhood sales, from its not bearing the cost of distant transportation. Indeed, no effort is made to produce it beyond the point of home consumption, and the necessity of freeing the land from blue-grass. Wheat is our only article of export, and every thing is made to yield to its culture.

Here, as in almost every other part of Virginia, the land has been reduced by close grazing. We are, however, fast awaking to the impolicy of this course. Even those who have been in the habit of purchasing cattle for future sale, (the only profitable grazing,) are giving it up. We have no standing pastures, being dependent upon the cropping fields for pasture. Add to this, we have discovered at last, that our corn-stalks and straw will yield more manure when wastefully given to a few cattle, than when altogether consumed by many.

I do not think that a particular rotation of crops is much observed among us. We cultivate in corn those fields which are too grassy to promise a crop of wheat without cleaning, and generally fallow in alternate years those which will answer for wheat, as long as their condition will permit. I will here remark, that we understand the term "fallow" to mean exclusively those lands which have laid out of cultivation for a year or more, whether naked or in clover, and which are broken up for wheat in the summer and autumn. I think the term has been frequently used by your correspondents in a different sense. Corn field wheat, except when highly manured, very rarely yields a tolerable crop. Hence, a practice is fast obtaining—more especially in Jefferson—of leaving the corn land over for fallow the succeeding year. However adverse to sound theory it may seem, to leave land thus naked, certain it is, that in practice it answers remarkably well; and I believe that it will be within a few years very commonly adopted. I understand that this practice is very general in Frederick and Washington counties, in Maryland, where the lands are admirably farmed. Our proper rotation will then be as follows: 1st. Corn. 2d. Rest. 3d. Wheat; followed by clover. 4th. Rest in clover. 5th. Wheat—growing a crop of corn and two of wheat fallow within five years. When a good crop of clover has been turned under for wheat, many of our best farmers venture to stubble for a second crop.

An interesting experiment has been tried upon corn land; just after the last ploughing, clover-seed has been sowed, and the result would have been highly satisfactory but for the summer drought, which we rarely escape.

Corn land is also very often left over for oats and clover in the spring, and has always produced better than other oat land. The clover sown upon the fresh land immediately after the oats are harrowed in, will very generally succeed much better than when put in the usual way upon the wheat lands.

The heavy expense attending the carriage of our products to market has been heretofore a great drawback upon the prosperity of the valley, and

nothing except flour has been available at all. A better day has now dawned upon us. The Chesapeake and Ohio Canal, and the Baltimore and Ohio Rail Road, both now in full and successful operation to Harper's Ferry, give us an outlet at that point, and have already reduced the expense in a very great degree. Within another year the completion of the Winchester and Potomac Rail Road to a junction with those great works, will leave us nothing to desire as to transportation, and must very materially enhance the value of our lands.

Our prospects for the present year have been marred by the unusual severity of the past winter. The cold and dry autumn prevented the vegetation of the wheat in due time. It came up under the snow in January, and began to promise fairly, but the subsequent intensity of the cold appears to have destroyed it in its tender state; and now it is very certain that the crop will be a very short one.

The foregoing remarks are designed to describe things as they are in this part of Virginia, and although devoid of any particular novelty, may not be without interest to those who desire information.

A FREDERICK FARMER.

From Dr. Lardner's Second Lecture on Steam, Delivered before the Liverpool Mechanics' Institution.

NEW MOVING POWERS, AND IMPROVEMENTS ON THE USE OF STEAM.

The celebrated Leslie has invented a method of producing ice, by the employment of sulphuric acid. This acid has such a strong affinity for water, that if it is present in an atmosphere filled with vapor, it will immediately seize upon the vapor and incorporate it with itself. He places water in a watch-glass under an air-pump, with sulphuric acid near it: the air being withdrawn from the pump, the sulphuric acid seizes upon the vapor as it rises from the water, and the water parting with all its heat to maintain the vapor, is converted into ice. In performing this experiment, it is necessary that the vessel containing the sulphuric acid should not be in contact with the water, otherwise the degree of heat which accompanies the combination of the vapor and the sulphuric acid would prevent congelation taking place.

A very pretty experiment, to prove that the atmospheric pressure is a great agent in preventing water from boiling, can be performed with a flask half filled with boiling water, and closed at the neck. If it is in that state plunged into cold water, it will boil; but the ebullition will cease when plunged into boiling water. This is because the cold water condenses the steam in the upper part of the flask, and, by removing the pressure, allows the water to boil; whilst the hot water keeps up the temperature of the steam which presses on the surface of the water so as to prevent it boiling.

From these investigations it may be concluded, that a liquid or gaseous state is not essential to the nature of any substance, but that its state is entirely dependent on the supply of heat which that substance has access to. We know that water can be passed through these three states, by the abstraction or the application of heat. Fluid mercury may be evaporated, and the fact ascertained by passing the vapor through a cold tube, and it will again assume a liquid state; it may also be made solid, so as to take a shape like a metal. The most refractory substances we know of are capable of being converted into liquids by heat. All the metals we know of may be brought into a state of fusion by a proper supply of heat; indeed, all substances, by proper treatment, may be seen in the solid, fluid, and æriform state. By turning the rays of the sun, through a lens, upon gold and pantinum, we can decompose them, and convert them into gas. There is only one solid which has not yielded to fusion, and that is carbon, or the diamond; but we can only conceive that we cannot reduce it, because we cannot command a sufficient quantity of heat to melt it and maintain it in a liquid state. Of all liquid there is only one which has not been congealed by the abstraction of heat, and that is alcohol, or spirits of wine.

We can only argue by analogy, that the bodies which exist in the gaseous state can be reduced to liquids or solids: which leads us to suppose that the substances known as atmospheric air, oxygen, hydrogen, &c. are, in fact nothing but the steam of various substances which cannot exist in the liquid state upon the surface of our globe without being deprived of a large portion of heat. This analogy has been confirmed by recent experiments and discoveries, particularly by those of our distinguished countryman Farrady. Neither steam nor any gas can be reduced to a liquid by compression alone, however high the degree of compression applied to it, notwithstanding the assertions of superficial writers, and even of some who are otherwise well informed, on the subject. But if, by the compression we could squeeze out the heat from these gaseous bodies, we could then liquify them. Dr. Farrady has substantiated this by actually converting several gases into liquids. For instance: he found, that when carbonic acid gas was submitted to a pressure of 1000 lbs. on the square inch, it became a liquid. It must, however, be remarked, that as the pressure is increased, the temperature is raised; and it is not until the gas is cooled that liquid is produced. These facts, united with the other analogy, afford such a high degree of probability, that, to a reflecting mind, there can be no doubt that every substance, in parting with its heat to a certain extent, becomes a solid; and it is possible to conceive that if, by any circumstances, the temperature of our globe were raised sufficiently, the water of the ocean would no longer be able to exist in a liquid form, but would assume the state of vapor, and mix with the atmospheric air. By the same cause, many of the solids would be converted into liquids, and fill the body of the ocean, so that we should have an atmosphere of steam, and an ocean of metal—a gold and a silver sea. Then, again by the process of evaporation, which causes liquids to pass into vapors, we should see the fable of Jupiter descending in a golden shower illustrated in golden and silvery showers. To carry the analogy still further; we know that water cannot exist in a liquid state at the poles. A slight decrease in the temperature of the globe, on a change of distance of the sun, would cause all the water of the earth to become solid; a further decrease would freeze the various gases, so that the air would drop down, and form an ocean of water; and a still further reduction of temperature would convert it into a solid body.

These circumstances suggest to a reflecting mind the beautiful adaptation of the different objects on the globe to each other, and the distance of the earth from the sun. Otherwise, those substances which ought to be liquid, for the sustenance of animals, would subsist in the solid state. It is not at all improbable, that the different planets have different substances in them, suitable to their distances from the sun; for there is no doubt that the temperature is produced by the sun, and depends on the sun's distance from the planets, and its intensity is diminished in proportion to its distance. In the planet Jupiter, the heat is twenty-five times less than it is with us; and water, on such a globe, could not exist in a liquid state, unless heat was supplied from other causes than the sun.

When we consider the prodigious mechanical power which has been obtained, by the mere ability, on our part, to convert a liquid or water into steam, and reconvert that steam, into water; when we consider the enormous amount of human civilization which has been produced by the due application of this simple physical effect; when we consider, that it is probable that the relations of the human race may be altered and modified by this application, and the very distances of the different parts of the world be changed by a speedy intercourse, and the prices of the objects of consumption be ultimately affected by it; when all these effects are attained by the mere fact of our availing ourselves of the simple physical effect of converting water into vapor and back again, we naturally say, where there is so large a field, and so many different substances from which the effect may be produced, should we not expect, from the large advances which are making in the generalization of these principles, that this effect may be produced from other substances. Water possesses several properties which render it the most hopeless and unfit for such an experiment. In order to convert it into vapor, we, of course apply heat. The least promising liquid is that which requires the largest application of heat; and, of all liquids, water consumes the largest quantity of heat, requiring 1000 degrees to raise it from a boiling state to a state of vapor: therefore, *a priori*, a philosopher would say, try spirits of wine, or a thousand other things, but do not try water, for this special reason. It may be said, that the cost and difficulty of producing any species of vapor does not depend upon the fuel necessary to produce it, but on the cost of the liquid itself. Supposing, then, we could get fuel for nothing, still water is the most unfit and unpromising agent. For instance: in the transport at sea, the source of heat is derived from coals, which are bulky, and are transported in the vessels in order to produce steam; the water at sea costs nothing: and, suppose the fuel cost nothing, still they must be carried, and they impose a limit to the application of the steam engine to the purposes of navigation. A vessel impelled by steam-power of 200 horses consumes one ton of coals per hour, or twenty-five tons per day: therefore, to provide for a voyage of twelve days, it would have to carry with it twelve times twenty-five tons of coal. Thus, therefore, there is a limit to the application of steam navigation. It is generally understood, that a vessel cannot carry more fuel than is necessary for the purpose of propelling it ten or eleven days; consequently, by the present steam impelling power, such a voyage as from Liverpool to New York could not be made for any practical and advantageous purposes.

In considering the prospects of improvement in these respects, we naturally look towards those liquids which are most readily turned into gaseous form. Ether and alcohol are easily converted into vapor, but in the way in which the steam power has been applied these liquids are rather expensive. If it was used in a high pressure engine the vapor would escape into the air and be lost, whilst, in a condensing engine, although not lost, it would be mixed with so much water that its separation would be attended with a considerable expense. There is only one other way in which it is possible to use alcohol, namely, by condensation, in contact with a cold surface. If we introduce the vapor of spirits of wine into a thin shell, formed by two bodies placed upon one another, after working the engine, it will spread over the cold surface of the hollow shell, the steam will be reconverted into a liquid state, and trickle out at the bottom, so as to be warmed over again, and this might be carried on from time to time.

But this great step must be followed by another improvement in the steam engine, especially for the purposes of transport both by land and by water, which will doubtless be cultivated in our own time. It is the application of the gases, and especially of carbonic acid gas, in a liquid form. If we could obtain carbonic acid in sufficient quantity, and on sufficiently moderate terms, there is no reason why it should not be employed to supercede steam at the present time. This gas takes the liquid form at the common temperature, under a pressure of 1000 pounds, and in that state exerts a prodigious power, and from its small bulk, would effect a saving of tonnage. The difficulty to its adoption lies in the price of the liquid, the providing of proper air-tight valves and pistons, and in guarding against the corrosion which the carbonic acid would cause in the materials themselves. But all these are matters of detail, and are at present but temporarily difficult, and we may, therefore, look forward to the superceding of coals altogether in the steam engine, by the use of the liquid carbonic acid, as nothing would be necessary except to send it into the receiver, and let the piston of the engine work as with steam; possibly it might be found expedient to apply heat, but a trifling degree only could be applied, as the power of the gas is so great that it has no bounds. Thus we should get rid of the magnitude of the marine boiler, and a thousand other inconveniences which attend it. We may, therefore look forward to the time when we may send our captains to sea with the wind that is to blow them in their waistcoat pocket; and it is not impossible, that we may get rid of those ugly smoky chimneys! which are at once so unpoetical and unpicturesque, and against which our sailors so bitterly complain, because they deface the surface of our beautiful sea.

OPERATION OF THE FENCE LAW ON THE POOR.

To the Editor of the Farmers' Register.

Brunswick, May 1st, 1835.

Although my experience or success will perhaps not justify any attempt by me to enlighten our people on the subject of agriculture, I am still

induced to hope from every day observation, that I may say something which will be of service to some one individual, who might be more active, and exert more influence in behalf of our own old Virginia.

Mr. Editor, it is not enough for me, to hear that a man is a patriot—he must be a *Virginia* patriot. Have we not great reason to doubt the patriotism of our political editors, when we see room, and to spare, in their papers, (if we are to judge from the trash which they sometimes present to us,) and not one single extract from your invaluable paper? Are they afraid of infringing upon your rights, or do they believe that your paper, (as good as all of them acknowledge it to be) is taken by all of our citizens? Or are they so absorbed in the subject of politics, as not to see that it would benefit rather than injure your paper? Or are they indeed enemies to the formerly sturdy and honest, but now withering and disreputable agriculture of this good old commonwealth? I would not charge them with want of patriotism, or with being enemies to the cause of agriculture; but I would charge them with a heedless forgetfulness of the best interest of our people.

There is an old proverb frequently used to prevent poor people from marrying, that "when poverty comes in at the door, love will jump out at the window," which although not always true, is somewhat applicable to patriotism. When poverty comes in, patriotism, I was going to say, would take its departure, but at all events I will say, we see daily the hardy yeomanry of our state, when they begin to feel the secret but chilling blight of penury creeping in upon them, after a long and desperate struggle between patriotism, and the want of bread, yielding to the imperious requirements of the first law of nature, and with almost bursting hearts, bidding farewell to the land of their nativity to seek a home in a more plentiful country.

But sir what is the remedy for this state of things? You will say, improve our lands and the people will not move. But how are we to improve our lands? In many ways, which our people will not listen to, but which they might be induced to attend to if proper means were used. Cannot the press throughout the state be enlisted, to encourage agricultural societies—to call upon enlightened practical farmers, when they are *electioneering*, if at no other time, to give their more uninformed neighbors some new notions on farming, and whilst they enlist their feelings in favor of the candidate of their choice, enlist them also on the side of agriculture—which is to injure no party, but enable them to enjoy more perfectly the blessings of civil liberty in their native land. Mr. Editor, I differ from you, if you think your paper alone sufficient to bring about an entire reformation in a short time.* There are a great many of our good citizens who take political and other papers who do not take yours, but who might be induced to read communications in your paper upon the recommendation of their favorite political editor. But there is one subject particularly on which we need the aid of the press generally and that is the present fence law. We would not ask them to join us, but only to call upon the people to examine the subject fully and impartially, but particularly that the poor would look into it—for lately it has been objected that the poor would be oppressed by the alteration. And when I took my seat to write it was mainly to say something on the subject of the fence law, as oppressive to the poor. And although you may be tired of my stuff, I will try and give you some of my notions on that subject.

I take it for granted that the richer class of the community ought generally, as they have the means, to be the most enlightened; and if so, they will very readily see the propriety of uniting in support of the proposed alteration: unless indeed they, or some of them, see the benefit which the poor would derive from it, and be unwilling that they should receive and enjoy that benefit. I have the charity to believe that there are very few, if any of that sort. But that it would not oppress the poor, I shall try to give a few amongst a great many reasons. I will start with this self-evident proposition, that it requires half as much fencing to enclose a square of one hundred acres of land that it requires to enclose a square of four hundred. The richer man has a tract of land of eight hundred acres, half of which, is arable land; the poorer man has a tract of two hundred acres with the proportionate quantity of one hundred acres of arable land. The richer man has twenty hands on his farm, the poorer the proportionate number of five. The poorer man, (I use the comparative degree as one would not be considered very rich or the other very poor,) has to perform annually with one-fourth the hands half the labor in fencing that his richer neighbor does: and the richer man has to cut annually twenty acres of his wood land for the purpose of fencing with his twenty hands whilst the poorer has to cut, not

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* Most assuredly we hold no such opinion—and none could be more absurd, at least while our subscribers do not amount to a fiftieth part of the farmers, even in Eastern Virginia—and perhaps bear no greater proportion to the number of those who read party politics, and almost nothing else—a kind of reading, which alone, and especially when (as is usual) confined to one side, teaches more falsehood than truth, and results more in ignorance than knowledge. In reply to a previous observation of our correspondent—so far from considering the extracting for republication from this journal, however frequently or copiously, as "infringing on our rights," it would be highly gratifying: and whether beneficial to our private interest or not, it would be greatly aiding whatever the Farmers' Register can do for the service of agriculture. But the true and sufficient reason for extracts being so seldom made by our brother editors, is simply this: their object is to make their papers as agreeable as possible to their readers and patrons—and to the great majority of them, subjects of party politics, and their usual accompaniments and embellishments, are the most pleasing. The censures of our correspondent then should be bestowed on the general taste of readers, even among the agricultural class, and not on the editors who minister to their pleasure, and aim to supply their intellectual demands.—Ed. Far. Reg.

five acres in proportion to his hands, but ten acres, since he has half the fencing to do which the richer one has to perform. But pursue the consequences: the poorer man in half the number of years has been obliged to cut down all his wood land, and the richer one by the same necessary course has only cut down double the quantity which the poorer has cut, and has still a good chance of woods left. And now see the condition of the poorer man compared with his richer neighbor. His neighbor having had less fencing, cutting, mauling, and hauling rails to do, has had more time to improve his land, (which improvement has been much less in consequence of the present law,) has in some sort gotten along in the world, and perhaps has a little money; whilst the other poor man, from the want of timber, is obliged to sell his land. His farm is now in market without a rail tree upon it. Who are the bidders? not his neighbors in moderate circumstances—no, they cannot buy for the same cause that has brought him to want, and because the land has no timber; but his richer neighbor, without an opponent, buys it at his own price, because he can open the wings of his fence and easily enclose so small a piece in a body with a large one; and the poor man is forced to leave all that is near and dear to him, and seek a home in a new country, not more highly favored than originally our beloved Virginia. And there is another view of the matter; the poorer man, from the weakness of his force, and the over proportion of his fencing, is apt to neglect his fence, and his richer neighbor's stock, four times as large as his own, break in upon him when he is perhaps from home, and destroy half his crop in one day—and then the falling out that takes place not only between them, but perhaps half the neighborhood are engaged in this dispute. Do you not perceive by the above named course, that the circumstance of our state being cut up into small tracts of land, has, under the present law, either driven from us the hardy yeomanry of the country, or brought upon many of them such abject poverty, as to render them very useless citizens; and that Virginia has principally been impoverished by the same circumstance, and its consequences. Thus, if the above reflections are sound, we see that the poorer a man is, the more oppressive in proportion is this odious law.

It may be objected that there are some so poor as to own no land at all, and that this rule will not apply to such. But how many poor have we who could rent and would cultivate a piece of land, which they might get for a very small sum, if it were not for the cost and labor of enclosing it; and how much waste land would the poor be allowed to cultivate, merely for the sake of having a small piece of meadow cleaned up for the proprietor, which meadow would yield the tenant an abundant supply of provender for all his stock. But Mr. Editor it is not for me to use such little arguments to trouble you—but our object should be to induce the people to attend to us whilst we give these arguments by word of mouth.

WAQUA.

From Dublin Medical and Chemical Journal.

INTRODUCTION OF FROGS INTO IRELAND.

It is not generally known that the introduction of frogs into Ireland is of comparatively recent date. In the seventeenth number of the Dublin University Magazine, there is a quotation from the writings of Donat, who was himself an Irishman, and Bishop of Fesulæ, near Florence, and who about the year 820, wrote a brief description of Ireland, in which the following passage occurs:—

> "Nulla venena nocent, nec serpens serpit in herba;
> Nec conquesta canit garrula rana lacu."

"At this very hour," says our respected contemporary, "we have neither snakes nor venomous reptiles in this island; and we know, that, for the first time, *frog-spawn* was brought from England in the year 1696, by one of the fellows of Trinity College, Dublin, and placed in a ditch in the University park or pleasure ground, from which these very prolific colonists sent out their croaking detachments through the adjacent country, whose progeny spread from field to field through the whole kingdom. No statue has yet been erected to the memory of the natural philosopher who enriched our island with so very valuable an importation of melodious and beautiful creatures." We may state, however, that we have learned from good authority, that a recent importation of snakes has been made, and that they are at present multiplying rapidly within a few miles of the tomb of St. Patrick.

THE INJURIOUS EFFECTS OF HEAT ON CULTIVATED LAND.

To the Editor of the Farmers' Register.

Fauquier, April 21st, 1835.

In two communications I addressed to you in February last, I stated that "*heat is a great destroyer of the vegetative or nutritious principles of the earth.*" So far as I then knew, or now know, that opinion is peculiar to me. Its novelty, and the rational deduction of the fact from the premises, justified its publication, in the double hope of establishing its truth, or of exposing the error. Mr. James Fife has contested its correctness; and while I have neither leisure nor inclination to discuss, with labored minuteness, my own opinion, or his replication, I will proceed to make a brief reply.

Mr. Fife says, in submitting "some difficulties that lie in the way of my proposition and illustration," he could, "for example, select lands in the torrid zone, exposed to the heat of a vertical sun, and producing large crops, notwithstanding the frequent stirring in the hottest time. How is this, if the sun kills the nutritious principles of the earth?" It is said there are exceptions to all general rules, and correctly. Mr. Fife may know of some land in the torrid zone, which produces "large crops, notwithstanding the frequent stirring in the hottest time;" but, I marvel greatly if such be the fact. Let it be borne in mind that I have not said that one crop, or two, or ten crops of corn, tobacco or any other plant, would in every grade and variety of soil produce effects equally injurious. I did not, and could not say, that rich river low ground would be exhausted as soon as poor river hills. The poorer land is, the easier is it reduced to sterility. Now, it must be obvious to the capacity of every man, that land under the torrid zone which has been often cultivated and still pro-

duces good crops, must have been, originally very fine, or have been made good. If it was originally good, I venture to say it is now worse, unless improved by art. Will Mr. Fife say, that, after repeated consecutive cultivation by that minister of desolation, the shovel plough, it is as good as when first the forest was felled? Can he venture such a declaration in the face of the whole earth? The testimony of every man—of every "beast that bites the grass or browses on the shrub" will confront and confound him. I will not attempt to prove what is universally known to be true, that all land—land of every grade of fertility, of every geological base, from barren sand to the deep and inexhaustible beds of alluvion on the shores of the Mississippi, deteriorates under the cultivation of corn, cotton, tobacco and other spring crops, which require the earth to be kept pulverized until the plant is matured. But, it deteriorates in a greater or less degree as the land is poorer or richer. The thin soil of sand hills vanishes in the third crop of corn, cotton or tobacco; while the soil of the Mississippi, the Red River, the Yazoo or Big Black, twenty feet deep, cannot be exhausted till the bottom be reached; for as the vegetable mould of which it is composed sinks beneath the exhausting action of the sun, the plough descends with it to a bed not heretofore disturbed. It may be, that land in the torrid zone, of the same base, is not so much injured by cultivation as in our latitude. The rains of that region are more frequent, and dews manifold more copious than in Virginia The moisture of a southern atmosphere is, also, a part, and a leading part of its natural history. Here our summers are dry, and the sun more intense than far south of us. They are, at stated hours of the day, refreshened, by steady breezes from the sea always charged with invigorating salt-water vapor; and at night their copious dews impart a delightful coolness to the air. Here we have, occasionally, slight breezes—generally dry; slight dews till late in the summer, and hot nights. In the north the land is not galled as here, in part owing to three causes about equal in their effects:—the sun affects us two months longer in the year than it does them—their land is better cultivated, and there is no negro labor to beget idleness and its handmaids, shovel ploughs, new hopes and disappointed expectations, rags and debt.

It is known to all, that one of the principal means of improving worn out land, is the mould-board ploughs, the bar-shares of my friends and countrymen, McCormick, Stewart, Kemper, Fletcher and Green. The benefit is derived, in my opinion, from various causes. The earth which has been exhausted by the sun is turned under, where it is kept till the next fallow, while the loam or other soil never before reached by the plough is thrown to the top, where, from the action of the sun, rain and atmosphere, noxious principles are expelled or neutralized, or those that are valuable are imbibed. I suppose that Mr. Fife did not understand me to say, that the sun, in all the degrees of its influence on the earth, is injurious.

All crops that require frequent ploughing in the spring and summer, corn, cotton, tobacco, turnips, &c., have the character of exhausting crops, when others that yield as much in weight are known not to impoverish the ground: for instance, wheat and rye. If it were not the mode and period of cultivation that does the injury, principally by exposure to the sun, all crops of equal weight would reasonably do equal harm. The universal testimony of experience is, however, that corn, cotton, tobacco and turnips, are exhausting, and, that wheat and rye are improving crops. What other cause than the mode of cultivation can induce so great an injury? The repeated ploughings, erroneously deemed to be necessary to make these crops, renders the earth so light or loose as to receive the heat of the sun to the depth of the ploughing. The top earth is most injured because most exposed to the sun, and after it has been subjected to his rays for some time, another surface is thrown up by another ploughing, and so on, till the whole body ploughed for corn, &c. is successively operated upon, and finally, the whole is left open for years before it regains its former compactness. Clay from the bottom of wells, cellars, &c. after a few years produces luxuriantly.

As to Mr. Fife's notion that the mixing of water with earth destroys the fertilily of the earth, I can say no more, than it is the first time I ever heard that water was not a valuable, nay, an indispensable agent in the growth of vegetables. Heat is also indispensable; but too much of either destroys vegetable life; and "mortar" contains too much of the former. It is true, that by mixing water and earth more intimately than by the usual falling of rain, when dried it is harder; but no other injury can be done by the admixture. If it can, the more rain the greater the injury; and what then becomes of the well established fact of the fertilizing properties of water? The bottoms of rivers and ponds too would be very poor instead of being very rich. Roads that have been used for seventy years, although trampled thousands of times more than mortar for bricks, it is every day's practice to reclaim by the usual methods of improvements. Let me here make the conjecture, that if the dust of hard burnt bricks be subjected to the same means of improvement with well trodden roads or dried "mortar," that the end will be a thorough conviction of the impracticability of the one, and the easy accomplishment of the other.

Mr. Fife is respectfully advised to visit north Alabama, (the great bend of the Tennessee,) a country of as high reputation for fertility, a few years ago, as any in the south, and see for himself, its present thriftless condition. Originally, indeed, not more than fifteen years ago, very rich, of dark red loam, with a surface among the most beautiful and convenient for the purposes of agriculture on earth; the effects of the sun upon it, exposed as it has been by shallow ploughing, have been ruinous. Corn and cotton have thus ruined that, as corn and tobacco have this country. Again let Mr. Fife go into the Dutch settlements of Rockingham, Shenandoah, Loudoun: to Pennsylvania, New Jersey, and New York, where they have to a very small extent cultivated corn; where wheat and rye are the staples and are produced abundantly, and he will see the difference between those regions, and the land of corn, tobacco, and cotton.

It is generally thought that the hickory, lombardy poplar, &c. exhaust the earth, and that the yellow locust improves it. The instances cited are where the land is cultivated in corn or other spring crops. The earth under the former is gene-

rally exhausted where it *is cultivated;* but not so under the latter. The reason is that the roots of the former are much more shallow than those of the locust, and of course, the ploughing is not deep. The body of earth thrown up by the plough under the poplar and hickory, is not half so deep as under the locust, and the power of the sun is proportionally greater on it. Who is he that can point out the difference in the fertility of the ground well covered by grass, where the largest poplars and locusts have grown for many years in the same yard? The earth under trees, whose roots are shallow, is merely scratched on the first ploughing, and from the repetition of it appears to be dead or exhausted; while under the locust, the apple, the peach tree, &c. &c., whose roots are deep and not reached by the plough, its advances in improvement are at least as fast as where there is not a tree.

My communication is growing too long, and whatever other views I have, must, if at all, be forwarded to you hereafter. Such as are here thrown together depend rather on the experience than the theories of men.

J. R. WALLACE.

From the Genesee Farmer.

THE BUFFALO BERRY.

Last autumn we procured of Judge Buel, three trees of the buffalo berry; and this spring when they came into flower, we found that one plant is *staminate* and the other two *pistillate.* This discovery is very gratifying; for it is well known that like the date palm, none of these trees are expected to be productive unless both sexes grow in the same neighborhood. Whether there is any way to propagate them except by the seed, we have not been informed. Last year we tried *layers* on another plant which we had previously obtained; but none of them rooted. If it could be increased by some such mode, we could then be certain of having both kinds; and we should not be subjected to the risk of having only *one* sort when we procure *two* trees. If they can be readily increased only by seeds however, it will be well to purchase only such trees from the nurseries, as have had blossoms; and as these appear while the trees are small, this precaution will not be attended with much inconvenience. Ours are not five feet high.

From the Genesee Farmer.

THE OSAGE ORANGE.

We have been informed that this fruit ripened the last season for the first time, east of the mountains. Our friend T. S. Pleasant has kindly supplied us with seeds from his trees at Beaverdam in Virginia; and we have now a number of plants which sprung from them in a hot-bed. They germinate freely.

This tree is also *diœcious.* We have a pistillate plant eight or nine feet high, which now appears to be preparing to blossom; but as this is the only tree of the sort in our possession, we cannot expect much fruit—which however is only to be prized as a curiosity, or as the means of propagation. Pistillate trees indeed, sometimes produce hermaphrodite flowers, and consequently some fruit; but never in much quantity; and this exception to a general rule, seems only to be a provision of nature for preserving the species under extraordinary circumstances.

With *layers* of this tree we have always been unsuccessful; and equally so with *cuttings* of the branches, though we have succeeded with pieces of the root. Whether we shall hereafter become more skilful or not, is uncertain, but at present we are inclined to believe it can be most readily increased by the seeds.

From Jameson's Philosophical Journal.

SUBTERRANEAN LAKE AND ITS INHABITANTS.

"The most striking example which we can mention of a subterranean sheet of water, of a varying level, is that of the Lake Zirknitz, in Carniola. This lake is about six miles long by three broad. Towards the middle of summer, if the season be dry, its surface rapidly falls, and in a few weeks it is completely dry. The openings by which the waters retire beneath the soil may then be distinctly perceived, sometimes quite vertical, and in other places bearing a lateral direction towards the caverns which abound in the surrounding mountains. Immediately after the retreat of the waters, all the extent of the surface which they covered is put under cultivation, and at the end of a couple of months, the peasants are mowing hay, or reaping millet and rye, in the very spot where, some time before, they were fishing tench and pike. Towards the end of autumn, and after the rains of that season, the waters return by the same natural channels which had opened a passage for them at the time of their departure. The description which we have just given of the inundations and retreat of the water, is the regular and common occurrence; but every extraordinary atmospheric change is apt to interfere with this order. Sometimes a very heavy fall of rain on the mountains with which Zirknitz is surrounded occasions an overflowing of the subterranean lake, which advances, during many hours, so as to cover with its waters the land which lies over it.

"Very singular peculiarities have been remarked as belonging to these different openings in the earth: some of them supply nothing but water; others supply a passage both to water and to fishes of a greater and smaller size; and there is a third class by which ducks are supplied from the subterranean lake.

"These ducks, at the moment that the water floats them to the surface above ground, swim with perfect facility. They are completely blind, and almost naked. The faculty of sight, however, is very speedily acquired; but it is not till after two or three weeks that their feathers, which are black, except in the head, are so grown as to allow them to fly. Valvasor visited the lake in 1687. He himself caught a great number of these ducks; and saw the peasants catch individuals of the *Mustela fluviatilis*, which weighed two or three pounds, tench of from six to seven pounds, and, finally, pike from twenty to thirty, and even to forty pounds weight. Here, then, it will be perceived, that we have not only an immense subterranean sheet of water, but a real lake, with the fishes and ducks which frequent the common lakes of the country."

For the Farmers' Register.

REVIEW.

Survey of the tide-water region of Maryland, and report thereon, by J. T. DUCATEL, *Svo. pp.* 61. *Document published by order of the Legislature of Maryland.*

The legislature of Maryland has latterly, in several important matters, exhibited a rare and laudable degree of attention to the general improvement of that state—and the means adopted to forward that great end, are manifestly not planned in subserviency to any narrow minded feelings of sectional jealousy, but are dictated by a liberal and patriotic disposition to use the means of all, for the general benefit of all. May the results be fully commensurate in reward with the enlightened acts and liberal means employed, and with the noble spirit which has prompted them.

Among the several means for promoting "internal improvements"— (a term generally, and with a singular degree of incorrectness confined in the United States to making roads and canals—) one of the least costly, and which was probably considered as of least importance, was directing to be made a geological survey of the territory of Maryland. But it may well be doubted whether the future benefits of a well conducted examination of the mineral treasures of the state, the making known all its dormant resources of wealth, and the instructing its citizens as to the manner of reaping such rewards, might not yield a richer harvest, than even the millions of dollars bestowed upon its magnificent canal and railway. And even if the actual plan, and consequently its execution, be defective, the benefits to be derived, though produced indirectly in a considerable degree, will nevertheless be of great value. We shall make free to point out what appear to be some of the defects either of plan, or of execution: and this freedom will be used the more readily because of the high value attached to the general plan, and the anticipations of beneficial results from its execution, so far as it has been completed, not only to Maryland, but to her sister states—to whom, in this respect, she has offered an example already followed by Virginia, and which will doubtless extend farther.

The most important and most abundant substance, by far, among the mineral resources of wealth in lower Maryland, is the immense underlying deposite of shell-marl. Accordingly, the various beds, their localities, qualities, and practical value as manure, constitute the greater part of the matters embraced in the report. This exhibition cannot fail to increase the zeal and industry of the farmers who have already been deriving profit from this manure, and to attract attention from, and invite to similar efforts, the still greater number who have heretofore possessed this resource of wealth without knowing or enjoying its benefits: and persons elsewhere will also learn to attach a more correct estimation to the great improvable value of this highly favored, and yet heretofore neglected and undervalued region—abused as in Virginia, both by the opinions of strangers, and by the practices of its cultivators.

The report has so far only embraced the tide-water region of Maryland, and the remarks on it which it is proposed to offer, will be confined to the most important object of investigation—the beds of marl. The results of the geologist's own observations will be copied at length.

"*Southern limits of the shell-marl deposite on the Eastern Shore of Maryland, available for agricultural purposes.*

"There is reason to believe, as stated in a previous report, that this shell-marl deposite underlies the whole of the country between the Delaware and Chesapeake bays, even to its extreme limits; but, as was also previously observed, it evidently inclines on the Chesapeake side, from the summit level of the peninsula to the water's edge. The dip of the formation is at an angle of about 5° from north-east to south-west. The inclination is not, however conformable to, though in the same direction with that of the country; a circumstance which it is important to attend to, as a neglect of it might cause fallacious expectations to be entertained of the discovery of marl in situations at its north-east extremity where it lies too deep, for profitable extraction; and, on the other hand, might dissuade from a justifiable research in situations at its south-west extremity, where though lying low and the country flat, it still may be found at a small distance only below the surface of the soil. It is likewise necessary to bear in mind what has already been said on a former occasion, that the surface of the marl deposite undulates; so that, it not unfrequently happens that the opposite banks of an inlet, present to view the summits of two waves of marl, so to speak, the trough of which constitutes the bed of the creek.

"Observations so far made seem to indicate that south of the Choptank, in Dorchester county—in the lower portions of the county—the marl in general lies too low to be advantageously extracted. It has been reached in the sinking of wells; but the only place where any indications of it present themselves above tide, is on the Choptank, west of Cambridge—at a spot called Sandy Hill. The material alluded to is covered by a stratum of sand from fifteen to twenty feet, contains impressions of scallop, clam, and other shells, and was observed in the high banks of the river, from the spot just named to beyond Castle-Haven. Subjected to analysis it was found to consist of carbonate of lime 23, silica 58, alumine 13, and a small proportion of iron. This is no doubt a continuation of the shell-marl deposite of Talbot county; and as no other indications of marl have been observed south of the Choptank, in Dorchester county, it may probably be assigned as the limit of that deposite in this direction. It is not pretended however, to exclude by this assignation the upper parts of said county which have not yet been examined.

"*Principal location of the shell-marl deposites between the Choptank and Chester rivers.*

"These deposites are in Caroline, Queen Ann's and Talbot counties, and will be most conveniently indicated under the head of each county.

"*Caroline county.*—At the head of the navigation of the north-west fork of the Nanticoke, at Federalsburg, there is a deposite of marl which lies high, and in a very accessible position; it owes its formation to an accumulation of fossil oysters, and other small marine shell-fish, some of them extremely delicate, giving evidence by the integrity of their parts that they have originated and died where their testaceous coverings are now discovered, and appear to have been subsequently enveloped in a deposite of clay. The material of this deposite may emphatically be called *shell-marl:* the enveloping clay contains from fifteen to twenty per cent. of calcareous matter, and the chief constituent of the fossils is the same fertilizing agent. The soil of the surrounding country is principally a light sandy loam; so that the marl which has just been described

consisting principally of carbonate of lime, and aluminous particles, is no doubt admirably fitted to impart to it the physical and chemical properties requisite to constitute a good soil.

"At Greensborough, the marl forms the substratum of the soil upon which the village is built. It breaks out on the west bank of the river, a few feet above tide. At low tide, it becomes very accessible, and from the nature of its constituents, as exhibited in the appended table, showing the result of the chemical analysis of the marls from the several localities in Caroline county, and the condition of the superincumbent soil, it will be perceived, that it must furnish a material of great value for the improvement of the latter. Reference must be made for the analysis of this marl, to No. 1. of the table.

"At Denton, or rather in its vicinity, several localities of marl were discovered, principally on the head streams of Watt's branch. They are generally, of excellent quality, and well adapted to use on the spots and in the vicinity of where they occur. See Nos. 2 and 3 of the table.

"Three miles below Denton, on the east side of the Choptank, there occurs a considerable deposite of fossil oysters, forming the mass of the banks of the river, from fifteen to twenty feet above tide. The neighboring country would derive great advantage from the general use of this material, and every consideration of individual interest and public usefulness, was accordingly presented to the proprietor of these valuable banks to induce him to employ their contents on his own lands, or dispose of a portion of them to neighbors willing to purchase. It is to be believed, that an intelligent citizen cannot long resist any proper appeal made to him, when conducive both to private interest and to public good." pp. 14 to 17.

This appears to be saying indirectly that the "intelligent citizen" had to that time not only refused to use manure from this inexhaustible body, but to permit it to be used by his "neighbors willing to purchase"—and it is only "believed" that "he cannot long resist any proper appeal made to him when conducive both to private interest and public good." If this is the meaning of the passage, the compliment to the marl bank and its owner is equivalent to a strong expression of deserved contempt for the latter.

"Another much more extensive, and more decidedly marly deposite, occurs on the estate of General Potter, at Potter's landing on the Choptank, between Kokias creek and Watt's branch. It affords several varieties of marl, (Nos. 4 and 5.) It is covered by a blue earth, which on analysis yielded the following constituents: alumine 10; carbonate of lime 9; silica 70, &c. This article might also be advantageously employed as an amendment to the soil by which it is overlaid; it is, in fact, a sandy marl. The enlightened and patriotic proprietor of this estate, has expressed his willingness to supply his neighbors with such quantities of these materials, as would afford them the means of satisfying themselves as to their efficacy." p. 17.

The owner of marl has as good right to sell it as any other commodity—though in some other places it is a thing unheard of for any man having an inexhaustible supply, not to *give* it freely to his neighbors. But it is a strange waste of encomium to speak thus in commendation of this "enlightened and patriotic proprietor" merely for having "expressed his willingness to supply his neighbors with such quantities as would *afford them* the means of satisfying themselves as to the efficacy" of his marl—that is, to let them test its value for his own future benefit.

"In the neighborhood of Hillsborough, marl of very good quality has, likewise been discovered.

"*Queen Ann's County.*—An important and valuable deposite occurs at the head of south-east creek, in the vicinity of Church Hill. It is found on a farm belonging to Judge Earle; at present, the residence of Walter J. Clayton, Esq. by whom it was made known. Its analysis is given at No. 6 of the table. Similar deposites may be expected to make their appearance at the heads of the several creeks, having a common estuary with the one just mentioned; namely, Hamilton creek and Island creek. Accordingly, an analogous deposite has been traced in the direction of the head of these creeks, to the north-east side of Corsica creek, reaching into that section of Queen Ann's county, known as Spaniard's neck.

"On the south-west side of Corsica creek, extending to the head of the branch south of Centreville, the marl is abundantly diffused. Nos. 7, 8, 9, 10, 11, 12 and 13 indicate the constituents of the various kinds found in this region, the samples of which, have been furnished by the gentlemen whose names are given in the marginal column of the table.

"Continuing in the same direction, being in a line north-east and south-west, to the head of Reed's creek, marl of superior quality (No. 14,) is found on the estate designated, as belonging to Maxwell's heirs. It is composed principally, of that variety of fossil shells, known in popular language, as *pearl shells* (*Perna Maxilla.*) These broad, thick shells, closely compacted together in the deposites, exfoliate, and crumble into almost an impalpable powder, by the least exposure to the air. They thus yield readily and abundantly, their calcareous particles to the soil.

Finally on Back Wye, where abundance, goodness of quality, and a judicious application on the part of those who are so fortunate as to possess the material, have co-operated, the most extensive benefits have already been realized. Nos. 15, 16, 17, 18, 19 and 20 of the table, indicate the chemical analyses; fossil constituents and localities of the marl in this section of the country. Nos. 21 and 22 indicate the constituents of two samples of shell-marl from Chew's island, taken from the estate of William Paca, Esq.

"*Talbot County.*—Nearly the whole of this county is underlaid by marl; but it presents itself under a variety of circumstances of unequal facilities for extraction, and is, as elsewhere, of very variable qualities.

"On the Talbot side of the Tuckahoe branch of the Choptank, it occurs in the high banks of the river from six to ten feet below the surface; but is exposed to view in the ravines that make down to the river. As every where else, it is undulating on the surface, occurring in a distinct stratum, from three to five feet in thickness, the inferior level of which, is six feet above high water mark; it is frequently covered by a crust of indurated marl mixed with sand, evidently caused by the action of the waters, which filtering through the loose soil above, on reaching the marl bed, have facilitated its decomposition, removing a portion of its calcareous constituents and depositing in their stead, silicious particles. The most remarkable deposite of this kind, is about three miles south of Hillsborough, on the farm of Thomas O. Martin, Esq.; a more interesting one, in every respect, can scarcely be pointed out in any other part of the county. In this place, the banks are elevated from thirty to forty feet above the river, and the deep ravines that descend to it, greatly facilitate the extraction of the material at all seasons of the year. This place may be mentioned as the only spot at which the bottom of the marl deposite is known to have been reached; unfortunately, the excavation was not sufficiently extensive to allow a satisfactory examination of its substratum; it appeared to consist in a stiff blue clay. The analysis of the marl from this locality, is given at No. 23 of the table.

"Descending the Tuckahoe into the Choptank, a little below Kingston, we reach the mouth of King's

creek. The high banks on the inlet of this creek exhibit thick beds of good marl, (No. 24,) the shells of which are imbedded in a stiff clay. The bed at one locality—on the farm of Mr. William Pratt—is covered by a thick stratum of a very plastic chocolate-colored clay, which itself might serve as a useful amendment to the thin soils of the surrounding country.

"But perhaps the most valuable beds of shell-marl in this part of Talbot county, inasmuch as they may be made extensively available to the public demands for the article, are those which were fully described in the preceding report. They occur three miles below Dover bridge, forming the high bank from fifteen to twenty feet above tide, being one compact mass of fossil shells, and extending nearly a mile along the river, on the farms of the late Col. Smyth and Mr. Atkinson. These beds are in contiguous strata, apparently successive, and consist of vast accumulations, principally, in the asscending order, of oyster shells, succeeded by clam shells intermixed with other marine shells, scallop, clam and scallop, and uppermost principally of scallop. Endeavor was made to bring these beds into notice, with a view of enlisting them into the public service, by giving to their proprietors what was deemed proper directions for extracting the material, and salutary advice as to a just estimate of its value, in order to secure a constant and permanent disposal of it. The subject is now in progress of experiment. South of these banks on the Choptank, no other deposite of marl is known to occur." p. 19.

Several of the foregoing passages, in addition to many other incidental remarks through the report, exhibit in many of the land owners a degree of neglect and ignorance of the value of their bodies of fossil shells, which is the more strange and unaccountable, when it is considered that the first known profitable use of this manure was made thirty years ago in part of this region of country, (by Mr. Singleton) and that the example had been successfully followed on many other farms in Talbot and Queen Anne's counties. The practice has not to this day extended to the Western Shore of Maryland, where the means are unlimited, as is seen in a subsequent passage which will be extracted from this report.

The reader would naturally desire to know, but is not informed, whether the "plastic clay" mentioned in the last paragraph but one, is recommended for manure, supposing it to be *merely a clay*, or as containing other useful ingredients.

"It will have been remarked, that these deposites are described as lying high above tide. It is, in fact, from this boundary of the county, that the dip from north-east to south-west in the marl deposite previously alluded to, becomes most apparent: occurring so far in Talbot county, only a small distance below the surface of the soil, it now becomes covered in the middle districts by a heavy coat of gravel and sand, extending from north to south from the head of Wye to the Choptank, and reappears again at a lower level on the banks, at the termination of the numerous inlets that so conveniently and beautifully intersect the lower portions of the county.

"A reference to Map A, appended to this report, will convey a better idea of the extent and numerous localities of shell-marl in this section of the state, than a bare mention of them by name could do. Suffice it to say in this place, that a line drawn from the head of Skipton creek, touching the intervening creek between this and Dividing creek, and perhaps, prolonged to the Choptank, would limit the eastern boundary of that portion of the territory which embraces the great shell-marl formation of the county; whilst another line from the mouth of Pickering creek, enclosing the western banks of Mile's river as far as the ferry; thence, by the head of Plain dealing creek to the Choptank, and uniting with the water boundary of the county, would form its western limits. Nos. 25 to 41 on the table, indicate the chemical composition of the marls from the principal localities of this great deposite.

"Nature of the materials contained in the shell-marl deposites of the Eastern Shore of Maryland.

"It is important to become acquainted with the precise nature of materials contained in these deposites; because upon this knowledge in a great measure depends the judicious application to be made of them. It is more especially to furnish such information that the table which has been so frequently referred to was made out. Some general remarks under the present head seem, however, to be necessary.

"Perhaps the true nature of these deposites is this. They are vast accumulations of the exuviæ of testaceous animals, formed at a time when the portion of dry land where they are now observed, was the bottom of an ocean. There is no evidence that their present elevated position is owing, to any upheaving of strata from below—the favorite geological notion of the day—nor to a simple retreat of the water from above them. They are generally overlaid by a thick covering of water-worn materials, such as gravel and sand, occasionally enveloping boulders of rocks belonging to the oldest geological formations; sometimes they are covered by a heavy stratum of clay; occasionally by alternate strata of clay, sand and gravel. In no instance, save when they form the bottom of an inlet or creek, or when they occur in the bed of a stream, has their surface been observed to be denuded. Some cataclysm contemporaneous with the cause of the retreat, has no doubt, occasioned the formation of these superincumbent strata. It is not worth while however speculating about this, at present; although it may be useful to know that the material by which the marl is covered is not contemporaneous with the marl itself.

"It is useful to know this, for two reasons. First, to become satisfied that the nature of the superincumbent soil cannot in any case be expected to partake of that of the underlying stratum of marl; hence it is never found to contain calcareous particles. Secondly, to understand the cause of the variety in the ingredients with which the marl is associated; thus we find the shells sometimes enveloped in clay, at other times in sand, and then again in a mixture of sand and clay, these two ingredients being in very variable proportions.

"Now although the marl does not influence the nature of the soil lying over it, the latter frequently greatly modifies the quality of the marl beneath it. The cause of this is apparent. The superincumbent earth (understanding thereby the whole mass of materials covering the marl) consists either of clay, gravel or sand, or a mixture of all these, and having, it is presumed, been deposited upon the marl subsequent to its formation, it will, from a variety of causes, have become mixed with it. It is, however, more especially by infiltration that the marl becomes modified in consequence of the condition of the soil above it. If the latter contain fine particles of sand, as is very commonly the case, these will be taken up by the waters that traverse the soil, and so charged, will penetrate more or less deeply into the marl bed. Should the shells there be loosely scattered in their mineral envelope, which is also frequently sand, the whole of their calcareous particles may be dissolved and become replaced by a silicious deposite. The bed of fossils will in this case, at least in its upper portions, exhibit an accumulation of indurated *casts* alone of shells. Such is the case in many places on Chew's island, in some of the fossil deposites of Skipton creek, and in several places on the Wye. It is evident that then the material cannot be used as marl. When again, the super-

incumbent soil is ferruginous, it very generally happens that the shells are bound together by an argillo-ferruginous cement extremely hard, which unfits them for use not only in this respect, but also by substituting for the calcareous ingredient which they originally contained a predominating constituent of oxide of iron, which cannot be beneficial to the soil.

"It must be borne in mind, however, that this sort of disnaturing of the shell-marl is most generally confined to the upper portions of the deposite. Hence, if in the search after marl, those silicious or ferruginous incrustations are met with, they should always be removed to ascertain the nature of the material beneath. There is a very remarkable example of a thick coat of silicious incrustations covering very excellent marl, on the estate of William Carmichael, Esq. on Back Wye, Queen Ann's county.

"As to the fossil constituents of the shell-marl deposites on the Eastern Shore of Maryland they are very various. Some are principally composed of oyster shells, others principally of scallop, some again principally of clam, and in others nearly the whole bed consists of *perna*, commonly known by the name of pearl shell. These last furnish decidedly the best marl. The perna is a broad, thick shell, somewhat in the shape of a large oyster, of a white pearly appearance, peeling off in thin laminæ that are very soft and friable. When exposed to the atmosphere for a short time it falls into an almost impalpable dust, consisting essentially of carbonate of lime. This shell occurs in most of the marl beds of the Eastern Shore, but more especially in those of Talbot county, and as already stated, at the head of Reed's creek, in Queen Ann's county.

"The quality of the marl is also greatly influenced by the nature of the shells that compose it. It was stated in the former report, and may be repeated here, in illustration of what has to be said under the present head, "that those beds which consist principally of *clam shells*, usually associated with numerous varieties of other smaller bivalve and univalve shells, containing at the same time very little admixture of foreign ingredients, yield a marl which exhibits its beneficial effects upon the soil in a very short time; because the calcareous particles are derived from shells which are very prone to disintegrate when exposed to the atmosphere. Marl beds, composed entirely or principally of *oyster shells*, are much less valuable, because of the slow disintegration and decomposition of this species of shell. *Scallop shells* resist such decomposition still more obstinately than do oyster shells, and when they occur, as they have been observed to do, in extensive beds firmly agglutinated by an argillo-ferruginous cement, they are useless in all soils, and may be positively injurious to some."

"It follows then, that the nature of the material in the shell-marl deposites must be ascertained first in reference to the species of shells which it encloses, and their admixture with foreign ingredients, as clay, sand, gravel, &c. This can be done by a simple inspection aided by such experience and knowledge as can be acquired without any difficulty. But a more important consideration relates to the *composition* of the marl, and especially to the relative proportions of its three principal constituents, namely, carbonate of lime, alumine and silex. To ascertain this recourse must be had to a chemical analysis. The proportion of calcareous particles is doubtless generally the most important fact to be determined; but it sometimes becomes equally important to ascertain the proportions of aluminous and silicious particles; for, one of the advantages, and not an inconsiderable one, in the application of marl is its use in ameliorating the mechanical condition of the soil, and these ingredients are eminently serviceable in this way.

"From what has already been said, it will readily be perceived that great variety must also necessarily present itself in the chemical composition of the marl in its different localities. So far as experiments have been conducted, it has been found that the proportion of calcareous particles varies from 20 to 60 per cent.; that of aluminous from 10 to 20 per cent. that of silicious ingredients from 30 to 50 per cent.

"It is doubtful whether any directions could be given which would enable those unpractised in chemical operations and manipulations to ascertain with any degree of accuracy the relative proportions of these constituents of the marl. This is a subject which must be submitted to some analytic chemist; and it is the duty of the geologist to satisfy inquiries of that sort whenever called upon for that purpose. On the proposed geological map of the state, it is contemplated to express the composition of the marl in the principal localities that will be laid down; and by extending the table exhibiting the chemical analyses of these marls, to all such as can be conveniently procured, a mass of information will be collected that will in some measure supersede the necessity of any further experiments.

Though the words of the last three paragraphs, if very strictly construed, may be maintained to be correct, yet they will probably convey a very different, and as we think, an erroneous impression to most readers. It may be readily conceded that no "directions could be given which would enable those unpractised in chemical operations and manipulations, to ascertain with any degree of accuracy the relative proportions of these constituents of marl"—if "these constituents" are to be separated with absolute accuracy, as arranged in the table of marls analyzed (p. 61,) under the heads of "*silica, alumina, lime, carbonic acid, oxide of iron, potassa,* and *water.*" To execute this separation correctly, would indeed require not only the labors of an "analytic chemist" but of one of a very high order of talent. If all Dr. Ducatel's analyses of calcareous marls were as carefully and accurately made, he has gone through a most laborious undertaking, and to very little purpose. But if this array of scientific terms and arrangement had not been brought forward, and served to create apparent difficulty, and the operation is confined to what is important and necessary to the farmer, the very opposite of the above opinion might be truly expressed, viz: that any person of ordinary intelligence may easily learn to analyze his own calcareous earths—and for all useful and practical purposes, with as much correctness as the analytic chemist. Farther—the results so to be obtained, would be even more correct than those of the author's analyses, on account of a defect in his mode of examination, which will presently be noticed more particularly. Such directions (for example) as are given in the Farmers' Register, Vol. I. p. 609, if attended to, will enable any one to analyze marl so as to know the amount of calcareous matter—and if desired, the proportions of silicious sand and aluminous earth, or pure clay, are as easily found. The two latter ingredients, however, would seldom require more nicety of observation than a glance at the residuum, as shown after removing the calcareous parts. The proportion of oxide of iron is still less important—(at least for any purpose yet known;) of "*water*" as a *chemical* ingredient of calcareous marl, our ignorance is readily confessed—but at all events, its presence cannot affect the value of the manure, except in adding to its useless weight. The column for potassa (potash) is a blank throughout the whole list of calcareous marls (being found only in the *green sand*, and not in cal-

careous marl proper,) and therefore is manifestly not necessary to be sought for in such marl. Then as to the main and all-important ingredient of marl, the calcareous earth, or carbonate of lime, an unnecessary obscurity is thrown over it by stating its amount in its two component parts of *lime* and *carbonic acid*, in separate columns. There is no reason for this, as these constituents always combine in certain and invariable proportions, to form carbonate of lime. But this is not known to every reader, and therefore the arrangement adopted keeps many entirely in the dark as to the strength of marl, and is even somewhat embarrassing and troublesome to the inspection of those who well know the proportions in which the constituents of carbonate of lime combine. If, for example, the marl marked 6 in the table, (p. 61,) had been stated to contain 38 parts of carbonate of lime, or shelly matter, in the 100, it would have been plain to every one: but as it is there stated to contain 21.25 of *lime*, and 16.15 of *carbonic acid*, it may be well doubted whether the information contained is not hidden from most of those interested in the report, and for whose benefit it was specially designed. Indeed, the constituent parts are improperly stated chemically, as well as for common and practical purposes. Neither "lime," nor "carbonic acid," ever exists in marl—but a third substance formed of these two. If it were proper to name the separate constituent parts of a body, though never found except in combination, instead of the compound itself—then the author ought to have gone back a step farther, and stated these ingredients in the more remote elements, which constitute by their combination the lime and carbonic acid—dividing the first into *calcium* and *oxygen*, and the latter into *carbon* and *oxygen*. Yet we have known nearly a dozen different men and boys, who, without knowing the meaning of either of these terms, or even in what proportions carbonic acid and lime combined to form the carbonate of lime, could analyze marl with so much ease and correctness, that their results might be received with confidence. To separate correctly and ascertain the proportion of the calcareous ingredients of marl, may be learned and practised more easily than either of the household jobs of making a pot of soap, or a loaf of good bread—both of which are also chemical operations. The process is so mechanical, that it has occurred to our mind that the business of *marl proving* was one that might be carried on advantageously for the undertaker, and still more so for his employers or customers. Any intelligent youth, or female, might learn the processes in a few days, and then, if receiving sufficient employment, might analyze any specimens of marl furnished, for a very small compensation, and yet make good profits. The indolence or negligence of most marling farmers will always prevent their performing this necessary operation for themselves—and perhaps many who even understand the process, would prefer to pay 50 or 100 cents for each trial, to any competent person who would undertake the trouble.

But besides the making a mysterious and difficult business of a very simple and easily practicable operation, there are strong objections to the results of the author, even though obtained by so much superfluous skill and care. In the general remarks on the table, he says—

"The owners of the marl-beds from which these specimens were taken, are informed that the operations for analysis have been conducted on small quantities of the marl (generally the friable portions of it) the larger fragments of fossil shells having been cast aside; so that when applied in considerable quantities, these shells will by their disintegration, furnish an additional proportion of carbonate of lime and consequently enhance the value of the marl. It was deemed more advantageous to operate in the manner just indicated, in order to ascertain more accurately the respective proportions of the different ingredients."

It is very true that this disintegration will go on, and consequently enhance the value of the marl; and the practical marler knows that this process generally proceeds so rapidly, that to exclude all the larger fragments of shells from the analysis, is equivalent to destroying its pretensions to accuracy. There are certainly objections to including the most indestructible shells, without any separate notice, and counting all the parts as alike: but of the two, this mode would be more correct, agriculturally as well as chemically, than the one adopted. The farmer knows, or will soon learn, that the fossil oyster, and scallop shells are very slow in coming to pieces, and that therefore they are of but little value. But the white shells seem to be dissolved by combining with the soil, (if in a soil much needing calcareous manure,) and however solid when applied, will mostly disappear in a few years.

So much as to the analysis itself. But even if that process is perfectly accurate, and altogether unobjectionable as to each particular specimen of marl, the manner of selecting the specimens may have been such that the results of analysis may be of little value for showing the average strength of even one body of marl—and of far less, as evidences of the average quality of the marls of a neighborhood generally. The geologist does not always say how his specimens were obtained: but as it is almost impossible that he could have selected many himself, it may be inferred that most of the specimens were selected by other persons. Then the chemist is not responsible for the specimens showing any thing like fair averages of quality, and there are several reasons for believing that without a proper and careful selection of specimens, the most correct analysis is of no value, except as showing the constitution of the particular specimen examined—or (in some rare cases,) some new ingredient, (as green sand, for example,) and of course suggesting the probability of the presence of that ingredient through an extensive region. When the author describes the marls of a particular farm, and even generally of a neighborhood, he refers, in most cases, (as is seen in the foregoing extracts,) to one or two specimens only, in his table, to show the quality. Now we have rarely, if ever, seen a single bed of marl dug into eight feet, that did not present different layers of various degrees of strength in shelly matter. Sometimes one layer lying within a foot of another, above or below, is of double the strength—and sometimes a bed which in part contains 60 or 70 per cent. of carbonate of lime, will in another part be below 20, and not worth using. The diversity is greater in different beds on the same farm, and still greater through a neighborhood of some extent. Of course, one or two specimens, and especially without particularly de-

scribing the precise locality, and from what part of the bed each was taken, could give but little if any information, even if selected by the geologist himself. But if selected by othes—either ignorance, or carelessness, or self-interest, or a desire of a proprietor to show better marl than others, might cause an exhibition of a very rich specimen from a bed generally much poorer. For these several reasons, but little importance can be attached to the results presented in the table of calcareous marls—and so far as our latter objections apply, the fault is not the author's, (nor the proprietor's) but of the plan fixed by law under which he acted, and by which he was bound to be governed. In making it the duty of the geological surveyor to analyze the various specimens of marl, soil, &c. sent him by any proprietors, he was left no choice but to perform a vast deal of arduous, yet mechanical, and often useless labor, of which the results must be necessarily mostly mere rubbish. The worker of a marl pit who desires to know its average strength, should take specimens carefully and fairly selected at various depths, and certainly at every change of appearance. A single digging may sometimes require a dozen trials, if great accuracy is deemed necessary. But after this is done, the same bed might be worked for years, without showing a variation worth notice, from the same general character, or average strength. And indeed, the practised eye may easily know the same bed though found at some miles distance, and may be satisfied with the analyses made from the earlier known locality.

The observations made by the author through the report are as often agricultural as geological, and on that account might be supposed to promise the more value, to the farmers of Maryland. But the duty was of course confided to one chosen as a geologist and chemist, and not as an agriculturist—and however desirable the union of all three branches of knowledge may be in the individual appointed to make a geological survey, it is not to be looked for. But it may perhaps deserve consideration whether the general and most important objects of such a survey would not be advanced by the aid of an intelligent agriculturist to the more scientific labors of the geologist, and which should be confined to drawing these practical deductions for which the man of science is rarely qualified. If one of the many enlightened farmers of the Eastern Shore of Maryland had for this purpose been associated with the geologist the latter might have been saved much of the trouble of making observations of matters of practical agriculture, and that branch of the subject could have been made far more full, correct and useful.

It seems to be a remarkable deficiency in the report, that though it was made by the law part of the surveyor's duty "to analyze and ascertain the qualities and properties of all specimens of mineral substances, *or soil*, left at his office or residence, for that purpose by any citizen of the state, and taken from any portion of the territory of the state"—that not a single analysis of any *soil* is given. Nor is there any indication of the constituent parts, other than such as the eye of an unlearned observer might direct, except that it is incidentally and slightly observed (p. 21) that the soil lying over the marl "is never found to contain calcareous particles." If the author meant to convey (as is maintained generally in the Essay on on Calcareous Manures—) that the soil is generally, if not entirely destitute of any portion of carbonate of lime—it would have been gratifying if he had been more particular, and had commented on the remarkable difference in that respect between the soils of that region, and the usual constitution of most of those soils in Europe of which any knowledge is to be gained from books.

In furnishing directions for working marl pits, and applying marl, and making observations on the practical effects of the manure, the author quotes largely from the Essay on Calcareous Manures, to which work due credit is given. We will pass by this part of the report, and proceed to the account of the beds of marl, and the green sand formation of the Western Shore of Maryland.

"*Principal localities of the shell-marl deposites on the Potomac, their constitution, relative value, and use.*

"As the use of marl has scarcely been at all resorted to on the Western Shore of Maryland—although from its quality as it there occurs, and the condition of the soil by which it is overlaid, its application would be of the greatest benefit—it is deemed a matter of infinite importance to indicate, as precisely as the extent of the examinations so far made will permit, the situations in which it has been discovered, or where it is likely to be found by proper research.

"A very extensive and very accessible deposite of marl occurs near Piscatawa, on the north side of the creek. The bed is overlaid by a thick crust of indurated shells and sand, that can, however, be easily removed, and beneath which is the friable marl in an excellent condition for immediate use. The analysis of this marl is given at No. 42 of the table. No. 43 indicates the constitution of a marl occurring under similar circumstances with the preceding, at Upper Marlborough. These two localities are to be considered in fact, only the most prominent points of a great fossil deposite, extending from Fort Washington to the west branch of the Patuxent. This deposite will, no doubt, be soon discovered on intermediate spots, from which it can be extracted with equal facilities, so as more generally to diffuse the benefits which its application to the soil must inevitably produce. The situations that may be indicated, as those where it is most likely to make its appearance, are along the small branches that make into the Piscatawa, on either side. The village of Piscatawa is based on a bed of marl, and in its vicinity, at a place called the marl bottom, the material has been employed with the usual success. We are indebted to Dominick Young, Esq. for this perhaps solitary, experiment made on the Western Shore of Maryland, on the good effects of marl. Much regret is felt, that, owing to the absence of that gentleman from his plantation, a full account of the result of his experience was not obtained. It is desirable indeed to ascertain the operation of marl on differently constituted soils, and a knowledge of their natural fertility or susceptibilities—never better discovered than by agricultural experiments—is essential, in order to arrive at safe conclusions. The directions given in a former part of this report as to the manner of employing the marl on the Eastern Shore, will no doubt apply here: at all events it will be perfectly safe to follow them on wheat and corn lands; but we possess, as yet, no information as to its effects on tobacco lands. Reasoning from analogy, no mischief can be apprehended from the use of marl on these as on other lands; but in order to direct its proper application, as to *quantity* especially, we should be aided by at least a few positive re-

sults. It is hoped that the efforts made to interest the planters of this part of Prince George's county in the subject, will soon supply this desideratum.

'Charles county, also, is abundantly supplied with marl. A great deposite of fossil shells, similar in character to that at Fort Washington, occurs between Pye's landing and Indian-head, stretching across Cornwallis neck to the Mattawoman. A partial application of the material from this locality, is said to have been made to the soil above it by the former proprietor of the landing, and report states that it proved very serviceable; yet it was discontinued. We have the assurance from the present owner, Mr. John Pye, that it shall not be any longer neglected. The banks of the Potomac, from what are termed the blue banks along Wade's bay to Smith's point, exhibit likewise one continuous deposite of fossil shells from thirty to forty feet above tide. Nos. 46 and 47 indicate the analyses of these marls.

South of the Mattawoman, and embracing the large tract of land between it and Port Tobacco river, the diluvial formation composed of gravel, sand and clay, having a depth of from one hundred to one hundred and fifty feet, rests upon a great bed of *blue marl*, possessing very remarkable characters. Subjected to analysis, it proves not to be rich in calcareous particles, but it frequently contains *potash* as one of its constituents, by which it becomes assimilated to the green marl, so called, of New Jersey and Virginia, known to possess very fertilizing properties, although frequently without a trace of lime; as was ascertained by Professor Rogers of William and Mary college. The analyses of these marls are given at Nos. 48 to 53 of the table. It may be well to remark, that the parcels submitted to analysis were obtained under quite unfavorable circumstances, being mostly the superior water-worn portions of beds thus uncovered at the bottom of ravines, and made known during our examinations of the past year. A transient inspection of these deposites led to suspect that at a greater depth, their contents would be found more valuable—inasmuch as they might be expected to yield a larger quantity of fossil shells, which by their disintegration would increase the proportion of calcareous particles. This conjecture has been verified by the subsequent researches of Capt. Walter D. Miller on Ward's branch in Nanjemoy. An immense agricultural resource is thus shown to be at hand for the benefit of this portion of the state, of which the intelligent planters of this district, in Charles county, will certainly lose no time in taking advantage. The places at which it has been so far discovered, are the heads of the small branches making into the south side of the Mattawoman, on the plantations of William Dulany, Esq. and Mr. John Pye; at the heads of similar branches emptying into the Nanjemoy, on the estate of Capt. Alexander Gray; and at Port Tobacco It may confidently be looked for at the head of all the deep ravines that furrow the highlands, to discharge their waters into the Potomac or its creeks.

"From the nature of this *blue marl*, and the condition of the soil belonging to the hilly lands in this section of Charles county—deprived in a great measure, by washing, of their natural soil—it is believed that small applications—say of ten loads, or one hundred bushels to the acre, aided by a few loads of stable manure, and repeated to a given extent at intervals of four or five years in proportion to the progress of improvement in the soil—would be very profitable. Such soils, moreover, as are apt to wash, will by this operation have their texture greatly improved, and will be found much less liable to run into gullies. An important observation related by Mr. Ruffin is that "when a field that has been injured by washing, is *marled*, within a few years after, many of the old gullies will begin to produce vegetation, and show a soil gradually forming from the dead vegetables brought there by the wind and rains, although no means should be used to aid this operation."

"The next variety of marl to be described as appertaining to Charles county, is perhaps the most valuable material of this kind which the state possesses. It has been identified, as well by its geological relations as by its chemical composition, with the green-marl of New Jersey and Virginia. This formation in Charles county, so far as it has been traced, occurs on the Potomac, between the mouth of Port Tobacco river, and the mouth of Pope's creek, constituting the high banks of the river in nearly the whole of this extent. The situations from which the material was procured for examination are, St. Thomas's Manor, at Chapel Point, and the plantations of G. Brent and R. Digges, Esqrs. Nos. 54, 55 and 56 of the table, indicate its chemical composition." p. 43 to 46.

"To give some idea of the value of this marl," the author then quotes at length from Professor Rogers' paper on the discovery of green sand in Virginia, [Farm. Reg. Vol. II. p. 129,] the statements of the remarkable effects produced on lands in New Jersey—and afterwards the description of that earth. As the entire communication is in the hands of the readers of the journal for which these remarks are designed, these quotations will be omitted here. The author then proceeds—

"The general appearance of the *green-marl* in Charles county, is pretty well represented in the name which it bears. This however, may be owing to its having been observed so far only on the dry banks. The particles of the so called green sand which it contains answer exactly the description given of them; "they are easily recognized by their want of lustre, the ease with which they may be bruised with the point of a knife, and the bright green stain which they then produce." Some of the fossils supposed to be characteristic of the formation, were also observed, especially the fossil shell called the *Gryphæa*, described as "having one valve very deep and convex, and the other flat;" and *lignite*, or carbonized wood. In two localities, at Mr. Brent's and Mr. Digges's, groupes of crystalized selenite, or gypsum, are found in the green marl; but as they occur always in the upper portions of the deposite, at a uniform elevation, and as it were in a continuous stratum, (the marl being covered with a thick coat of ferruginous sand and gravel containing iron pyrites,) it is presumed that the selenite is only an accidental constituent of the *green-marl* of these localities, produced by the decomposition of the pyrites and the action of the resulting acid upon the lime of the marl beneath. A similar formation of selenite, was described in the former report as observed in the shell-marl deposite at the mouth of St. Inigo's creek, on the St. Mary's, and this, as previously stated does not belong to the green sand formation. The phosphoric odor recognized by Professor Rogers in the marls of New Jersey, was not perceived in ours. But the foregoing points of similitude are sufficient to identify the deposites on the Potomac with the green sands of New Jersey and Virginia. On the other hand, a very useful accompaniment of the green marls of Charles county, is that of spheroidal masses of indurated marl, in shape resembling a gourd—whence they are sometimes called by the uninformed petrified gourds—and varying in size from the larger to the smaller kinds of this vegetable production. Some of these masses present when broken a nucleus apparently of the same nature as its envelope; others exhibit irregular cavities lined with an incrustation of a straw colored carbonate of lime, having the lustre of imperfectly bleached bees wax. Such is the character of these masses on the plantation of G. Brent, Esq. On St. Thomas' Manor, they more resemble irregularly shaped nodules, traversed by fissures, the sides of which are lined with selenite.

"Below Pope's creek, at Cliffton—a situation which

was indicated by Col. Wm. D. Merrick, and visited in company with this gentleman and the owner, Mr. Latimer—there is an immense deposite of a *blue marl* exceedingly rich in calcareous matter, and containing moreover a notable proportion of the green sand. The analysis of this marl is given at No. 57, of the table. The bed of marl now referred to is elevated from thirty to fifty feet above high tide, and is covered by a stratum of diluvial gravel from ten to twenty feet in depth. It is decidedly one of the most important deposites of marl hitherto discovered on either shore of the Chesapeake bay. Whenever the value of its contents shall be duly appreciated it will prove the source of renewed prosperity to the adjacent country, and of wealth to its fortunate proprietor. That marl is destined to become ere long an article of barter and exchange, as lime, plaster of Paris, &c. are now, there cannot be the least doubt; and no situation is known in Maryland that possesses more advantages for its easy delivery and general distribution than Cliffton. Should the public attention be called to this subject to the extent that it deserves, it is the duty of the state geologist to furnish proper directions for the best mode of extracting it. Other situations presenting the same, or not much inferior advantages, may be hereafter discovered.

"It was stated before that a stratum of *copperas earth*, was occasionally found associated with the marl of this region of country. It can be easily recognized by a greenish efflorescence which usually takes place on its surface after a very slight exposure, due to the formation of a saline substance characterized by a styptic taste, and very well known in the domestic and useful arts by the name of *green vitriol*. A stratum of this earth varying from twenty to thirty feet in depth was observed overlying the marl on the plantation of G. Brent, Esq. Care must be had not to confound this article with the green marl, which it somewhat resembles, as its application to the soil would probably prove injurious."—p. 47 to 49.

We have entire confidence in the statements and opinions of Mr. Rogers, as quoted by the author. But while admitting fully the facts of the remarkable and valuable operation of the green sand as a manure, in the cases cited, and in very many others, we more than doubt the soundness of what seems to be the deduction, that equal, (if indeed any) benefit may be expected generally on most soils of the region convenient to this earth where found in Maryland. The marl referred to above (No. 57) as promising so much value, even as an article of commerce, and stated as "*exceedingly rich* in calcareous matter, and containing moreover a notable proportion of green sand," contains, according to the table, only 13 per cent. of lime, and 11 of carbonic acid, (or 24 per cent. of carbonate of lime) and would be rated rather as poor than rich. We cannot be sure, from the manner in which the constituent parts are stated, how much of this specimen is properly *green sand:* but it cannot be large, as the potash, which forms one of its uniform constituent parts, amounts only to one per cent.

This singular earth, the green sand, offers a most interesting subject for both chemical and agricultural investigation—and one of which almost every thing is yet to be learned; and if the mode in which this manure acts, can be discovered, and its operation be secured in most cases when applied, then indeed it will prove a treasure of incalculable value. But so far, no chemist has even made even a plausible surmise of what constitutes the peculiar value of this earth, or how it acts: and we are at present persuaded that in practice it will rarely be found beneficial, unless when combined with calcareous manure, or applied to soil made calcareous previously by nature or by art. This is admitted to be an opinion, which, though founded in part on practice, needs many more experiments to confirm its truth. But if true, there can be no fair comparison of value between any certain quantities of calcareous marl and of green sand, as manures, unless the suitability of the soil for each is first ascertained. The application of one ton of green sand may in some cases add as much to the succeeding crop as 20 tons of shell-marl on another soil—and perhaps one bushel of gypsum elsewhere would be as striking in effect. But it would be a very incorrect deduction thence to estimate these several quantities of different manure as of equal value: and still more erroneous would the supposition be, if made in regard to soils, (such as we believe most in lower Maryland will prove to be,) on which neither green sand nor gypsum will show their best effects, until *after* the application of calcareous manures. According to these views, we infer that the marls of the Western Shore which are sufficiently rich in calcareous matter to be valuable on that account, and also contain a small proportion of green sand, will exhibit more effect from the latter, than even a pure green sand, without any accompaniment of calcareous matter.

Dr. Ducatel has found no trace of green sand in any of the marls east of the Chesapeake—but more or less of that substance is exhibited in all the specimens (in his tabular view,) on the western side, in Prince George's and Charles Counties. None of these are entirely destitute of carbonate of lime, as in much of the like formation in Virginia, and in New Jersey: but that ingredient is generally in small quantity, and in one (No. 54, from St. Thomas' Manor,) the proportion is only $2\frac{1}{4}$ per cent. Such earth as this certainly does not deserve the name of *marl*, if that term means a calcareous earth, or manure—and it is to be regretted that the countenance of a man of science should thus be given to this incorrect and inconvenient designation.

THE INEFFICACY OF LIMING SEED WHEAT AS A PROTECTION FROM HESSIAN FLY—TARRING SEED CORN.

To the Editor of the Farmer's Register.

I am aware that a large majority of your subscribers are as well, or better qualified than myself, to contribute to your valuable journal; this, however, shall not deter me from performing what I conceive to be my duty, and that of every farmer—being encouraged by the recollection of the poor widow's mite. If an apology should be deemed necessary for thus intruding, the only one I shall present is, that my example may prove an incentive to others, who, beholding my feeble efforts and penury, may be induced to contribute from their abundance.

But to the point. In Vol. I. page 351 of the Farmer's Register, there is an article, taken from the *Canadian Courant*, which professes to be an infallible method of destroying the Hessian fly, by soaking and liming the seed wheat. You, Mr. Editor, made some remarks upon this article, expressing your doubts both as to the remedy, and origin of the Hessian fly, and "invited the

expression of every opinion sustained by well attested facts on a subject so important." Of the origin of this fly, I know nothing. As to the efficacy of the above remedy, I had little more confidence than yourself; but thought it wrong to condemn without trial, and accordingly made experiment as directed—by soaking and liming a half bushel of wheat. This I sowed upon a good piece of land, on either side of which, and upon like land, I sowed unlimed wheat. In the spring, when I discovered that the fly had commenced its depredations, it reminded me of the lime experiment; and I at once determined to test its efficacy by making an examination. In passing through some unlimed wheat, I found the fly quite numerous: when I reached the limed wheat, my sincere desire was, that the experiment should prove successful, and that not a vestige of the fly be found; but alas! Mr. Editor, how often are our fondest hopes blasted. Upon examination, I found the fly as numerous here, as elsewhere, and, I really imagined, that it was more so. When this wheat was harvested I could not discover that it possessed any superiority whatever over the other, either in quality or quantity. This experiment I have never tried but once, and do not doubt but that it has proved successful under peculiar circumstances. But from the trial I have made, I am satisfied in my own mind, and shall never attempt it again, until the remedy has been fully, fairly, and incontestably proven to be effectual.

Whilst I am writing, it will not be amiss, perhaps, to fill out the sheet; you can take it for what it is worth.

As the season for planting corn is approaching, permit me to recommend an article in the 14th Vol. 59th page of the *American Farmer*, to the perusal of your readers, upon the subject of preparing or tarring seed corn, as a means of protection against crows, hens, black birds, and all others of the feathered tribe. In case the work should not be at hand, I will give the substance of the article, which will be sufficient for any one who is disposed to try it. The process is as follows: "Take a peck of corn and pour on it hot water, (without detriment)—after standing a few minutes, draw off the water. The tar, having been warmed sufficiently to reduce it to a fluid state, is then applied to the corn in small quantities, stirring at the same time, until all the corn is thoroughly daubed with tar. Then apply plaster, ashes or lime, one of these substances, intermixed with the corn will prevent cohesion and give better thrift to the crop. A peck of corn is as large a quantity as will be found convenient to operate upon at a time. A quart of tar is sufficient for a bushel of seed. The tar however, should not be applied sparingly. No injury, to my knowledge, has ever been done to seed, by any part of this process. I have practised preparing my seed corn in this manner for more than thirty years, and can recommend it as an effectual security against all manner of fowls that have been known to disturb corn fields." It would seem perhaps, that the author of the above, was rather sanguine in his assertions; but if any statement of mine, as an anonymous writer, will have any bearing, or corroborate those assertions, I can bear testimony to most of the facts therein stated. The tarring process has been practised upon my farm for several years, and as far as it has come under my observation, I believe it to be an effectual security against the depredations of the whole feathered family. But there is another advantage from tarring corn, which is, that plaster adheres more readily, and in a much larger quantity, which is a matter of much importance in this section of country.

I wish that some of my Madison and Orange acquaintances could be prevailed upon to write for the Register, knowing that they possess much interesting and valuable information, which they willingly communicate orally, but when applied to to write, they seem to startle at the very idea; and that false sense of reserve, or a distrust in their own dormant powers, so frequently condemned, and which has been so injurious to the agricultural interest, causes them to lose sight of every other consideration. Owing, no doubt, to this cause, much valuable agricultural knowledge has been lost to posterity: its possessors choosing rather to keep it locked up in their own bosoms, and carry it unrevealed to their graves, than to communicate in writing a few plain, simple, unvarnished facts: such Mr. Editor, as are not only more convenient to the editorial fraternity, but more interesting and acceptable to the general reader. There are other matters that I intended to have noticed, but fearing that I have already trespassed too long, and that I shall run into the other extreme, of writing too much, I am therefore admonished to conclude. May success attend you in the cause of agriculture—which is the cause of our country.

CROOKED RUN.

Madison County, Va.

[We concur entirely with our correspondent in the general remarks on communications from practical men, and the strong aversion to writing which such men generally feel. There are hundreds among our readers, each of whom could tell sufficiently well in few words, of some facts, or observations, which would be useful to many other readers, and perhaps interesting to all. But in addition to the general repugnance to writing, (which this work has done what we deem its greatest service, in lessening,) thousands of such matters are kept back by those who know them, because, as they would say, if asked to give any such matter to the public, "Oh! that is quite too trifling to write about." Now, this is a great mistake, which reason alone and common sense ought to prove—but which would be proved beyond dispute to every one who would look over any dozen copies of different agricultural papers. It will be there seen that nearly all the articles copied from other publications are very short—indeed it would seem that with many editors the small size of an article formed its principal recommendation for selection and republication. We have observed that most of the very short original articles in the Farmers' Register on particular subjects, are republished in almost every agricultural paper of the country—while but few that occupy several pages are republished in any: and none that are long, however good, are favored with any thing like the extent of circulation, as many of the shortest, of very moderate claim to merit. Let any of our readers try the experiment, by sending us some practical fact or useful

observation contained in half a column or less, stated in the most plain and simple manner, and also a communication of several pages drawn up with the utmost care, and in his best style—and we will pay any reasonable penalty if there are not manifest proofs exhibited afterwards that the first will have more readers, and more republications, than the last.

But though these reasons are stated as inducements for bringing forward the many short pieces which might be so readily furnished, let it not be thence inferred that we object to long ones, or that it is deemed desirable to compress any subject within smaller space than its full developement would make necessary. Such an inference, and the action under it, would be a greater error than withholding concise statements, because they cannot be presented in all the dignity of regular and extended essays. Every subject that deserves being treated at all, ought to be treated sufficiently in detail to be made clear—and to agricultural subjects more than perhaps any other kind, does this rule especially apply. That the length of a communication operates to lessen the number of its readers and to limit the extent of its circulation, is a fact which is to be lamented, but neither can nor ought to be disguised —and every writer may make good use of the knowledge of this evidence of the general carelessness or bad taste of the reading public, But if articles which require to be treated at length have fewer readers, they are at least more highly prized by those few; and thus perhaps gain as much, in the higher estimation of the few, as short articles do from a far more general, but more careless reading.]

From the Cultivator.

QUERIES AND ANSWERS IN RELATION TO SHEEP HUSBANDRY.

The five queries which are quoted below, came from an anonymous correspondent. They were forwarded to a gentleman preeminently distinguished as one of the best judges of stock, and withal an extensive breeder, who has promptly and very obligingly furnished us with the subjoined answers. *Ed. Cul.*

1. "Of what breed or stock had a beginner better compose his flock, his object being the growing of fine wool?" Pure Merino, crossed with high bred South Downs.

2. "What are the prices at which the Saxony, South Down, Cotswold, Leicester, Bakewell, or Merino ewes, can be purchased respectively, after shearing?" From a *good* flock, you cannot *select ewes*, or it would not long remain a good flock; lambs or yearlings may be selected perhaps—price very various—depending on purity of blood, and individual excellence.

3. "What breed produces wool of the greatest value?" Saxony *per pound*—Merino *per fleece*. "And what breed yields the heaviest fleeces?" The great Lincoln, or Romney Marsh sheep.

4. "What breed is most hardy and best adapted to our climate?" South Downs, *certainly*.

5. "On what lands how many sheep per acre can be profitably kept?" That depends on the breed of sheep, and quality of land, but much fewer than are generally kept.

The Saxon sheep undoubtedly produce the finest wool; but their fleece is light, seldom exceeding 2¼ lb. in weight, and is too open to resist our storms. They are feeble in constitution—require great care, are poor nurses, and their lambs are raised with difficulty. The mutton from such sheep must necessarily be of a miserable description.

I believe that in Connecticut, even the pure Saxony sheep may now be purchased at a comparatively low price, say from six dollars to four dollars a head, and perhaps lower still.

The *old fashioned pure* Merino sheep, which were imported by Col. Humphrey, and those associated with him, (but which are now almost extinct) were a much better constitution sheep, and *more* than made up by quantity for the difference in the quality of their fleece—the close, thick texture of their wool resisted our cold wet storms—their lambs were much easier raised, the ewes were better nurses, and on the whole, I am convinced they are a much more profitable sheep than the Saxony. I must, however, remark, there are several varieties of the Spanish sheep; and I would carefully avoid the "gummy"* family fleece, which however, must not be confounded with that, which, though of a dark color, contains only the grease necessary to render it impenetrable to the weather; the former being very objectionable to the manufacturer, while the latter is readily cleansed and worked.

I desire to be understood as speaking of the *pure* breeds, and not of *grade* sheep, which so universally abound in this state, for *they* have no distinctive or fixed character, but vary with their degree of consanguinity to the pure imported blood. Indeed I feel well assured that there are very few individuals of the pure unmixed blood to be found.

The earlier Merino flocks of this state, were obtained from the introduction of imported bucks, and those were purchased at great prices, which, with the native ewe, formed the ancestry of our fine wooled flocks; these had not attained nearly to the excellence of the pure Merino, in the staple of its wool—its compactness—its uniformity, or softness—when the Saxony cross was introduced, and became almost universal in a surprisingly short time—and this is the true history of almost all our fine grade sheep in this state. It is not, therefore, to these flocks that I allude, when I speak of *pure* Merino, or Saxony sheep.

As to price, I presume such Merino sheep are more costly now than the Saxony, from the fact that farmers are now aware of their error in using the Saxon cross, which has ruined the constitution of their flocks, decreased their clip of wool nearly one-half, and reduced their produce, until, with ordinary management, more than twenty-five lambs to an hundred ewes, are seldom raised. A Merino buck, of *unquestionable* purity, whose ancestry were both imported, will now sell for twenty-five and thirty dollars; the same animal. eighteen months since, might have been picked up at $8 and $10.

The Leicestershire, Bakewell, and Cotswold sheep are so crossed and mingled in this country, that the distinction is lost, excepting to the practised eye, who can find individuals in the various

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* The term "gummy" is in common use with farmers, and will be understood.

flocks which partake, as it may happen, more of the characteristics of one parent or the other.—These are a long, coarse wooled sheep, possessing much beauty of form, early maturity, and are quick feeders; but they require rich lands for their pasture, and though their constitutions are good, yet their fleece is sufficiently open to admit the penetrating rains of our severe storms, and then it is, that their heavy fleeces are seen separated along the ridge of the back, thus admitting the wet directly to the skin, until the animal is chilled through. They are good nurses, and make fine lambs; their meat originally coarse and long in the grain, and white in its color, was much improved by Mr. Bakewell, and under his management, became superior to the other large, long wooled sheep. Some of the best flocks of this variety may, I believe, be found in the sheep-folds of Mr. Dunn, and Mr. Wilkinson, in Albany county, or of Mr. Adcock, Mr. Musson and Mr. Clark, in Ostego county, all of whom have given much attention to this fine variety of sheep. Average produce in wool, I should think, from five to six pounds, though individuals are found, carrying fleeces of ten and twelve pounds! Price of good lambs, I believe, from ten to fifteen dollars.

The South Downs are as yet but little known in this country, but in my opinion, are decidedly better calculated than any other, for the domestic purposes of our farmers. They are of a medium size, beautiful in their forms, large loined, broad chested, fine in the head, small boned, and fine in the fleece, which averages four pounds in the ewes; the bucks reach to seven pounds; in quality it is equal to half blood Merino, but stronger in its filament, and *entirely* impenetrable to storms of snow, sleet, or rain; they are regardless of our coldest weather, and possess hardier constitutions than any sheep I know. The wethers attain to about 28 lbs. per quarter, and are allowed to be the best mutton sheep in England, the meat being dark in color, short grained, mild in flavor, and juicy. They are excellent nurses, and quick feeders. Here again, I beg to be understood as alluding to the *pure* and *high bred* South Down; such as it is found in the sheep-folds of the great sheep masters in Sussex; not the common, unimproved animal of the Downs, weighing 14 lbs. per quarter, and carrying but 2½ of wool.

As to prices—they are best ascertained from the sources of the respective breeds, and must vary much, according to the established purity of the blood, and the excellence of the individuals; the one a much more difficult point to ascertain than the other.

For the last three years, preparative to commencing my own flock, I paid much attention to the sheep husbandry of this district; visited those who owned large flocks, and soon discovered that they were all on the decline; I corresponded with others, and found the introduction of the Saxony blood was universally followed by a decline of constitution, and all its attendant evils; excepting in one instance, where a gentleman wrote me, that he had just purchased a flock of Saxon Merinos. He assured me that in Oneida county, they were a hardy, healthy sheep—shearing on an average about three pounds of wool, and the purer the Saxon blood, the heavier was the fleece! ! This was so contrary to my own experience, having materially injured a flock of nearly two thousand grade Merinos by one single cross of the Saxony, that I still continued my plan of forming a flock from the *pure, full bred*, large Merino sheep on the one part, and from the high bred sheep of Mr. Ellman's flock of South Downs on the other. Assisted by the indefatigable perseverance, acute discrimination, and previous knowledge of a friend (whose father was concerned with Col. Humphrey in his various importations and sales of such sheep,) I collected, after 18 months search, about thirty full bred Merino sheep, pure as imported, *known* to be directly descended from those importations. Their quality of wool is as fine as perhaps any grade Saxony flock around me. The ewes will average four pounds fleeces. My South Downs I imported from the celebrated flocks of Mr. Ellman, in England, whose two year old wether sheep beat all England last Christmas, at Smithfield, and took the first prize. He was judged to weigh 32 lbs. per quarter; and I am happy to say, has been presented to me by Mr. Ellman, as a specimen of excellence, and will probably arrive in this country before long, as he was to be shipped from London the first week in this month, for New York. From Mr. Ellman, I procured six yearling ewes, and a *yearling* buck; the ewes have wintered in a yard with an *open* fence, and an open shed, closed only at the back; they lambed there from the 23d to the 28th of February, on which day the thermometer was as low as 4°. On the 1st, 2d, 3d, 4th and 5th of March, the thermometer, in the shade, was from zero to as low as 6 degrees below zero, at sunrise! and yet my lambs, young as they were, never suffered in the least from the severity of the cold; they never showed the slightest consciousness of its intensity! and are allowed by all who call to see them, to be the finest lambs they ever saw. I find a rapid demand for all I can spare from both my flocks, at liberal prices. The engagements for my South Down buck, for next season, have been filled for some months past; and two days since Mr. Musson, a Leicestershire breeder, called to see him, when I took the opportunity of requesting he would weigh him—he very obligingly did so; and his exact weight was one hundred and fifty-nine pounds and a half. I have ventured on these minutiæ in regard to the *high bred* South Downs, as these sheep are very little known in the United States; and facts are more satisfactory than opinions: and again I must insist that I do not allude to the *unimproved* breed; I do not allude to the South Downs of Cully's day, from whose writings I have seen various extracts as descriptive of the breed, nor do I include the Hampshire Downs; I confine myself to the *high bred sheep* of the present day; and if any would oppose to them the fast rooted prejudice of high breeding being inseparable from delicacy, I would refer them to the facts above stated, and ask of them a personal inspection. I would further add, that it is an acknowledged fact, that Mr. Ellman's flock turns out more lambs than ewes! averaging 750 lambs annually, for several years, from 600 ewes.

A strong advocate myself for purity of blood, and a known line of ancestry, which confers excellence by descent, still, I believe, for this country, the most valuable description of sheep may be raised by judiciously crossing the Merino and South Downs, thus uniting the fine fleece of the one with the beautiful carcass of the other, and

gaining at once a constitution suited to our climate. This was done some years since, on the introduction of the Merinos into England, and was attended by the most flattering success, the flock beating every other for the combined excellence of wool and carcass. Both these breeds being fine, close wooled sheep, there is no extravagant dissimilarity, no wide contrasts to be amalgamated, and a more uniform character is easily obtained in the progeny, from which it will do to breed again. This is not the case with a cross between the long and short wooled varieties; the first cross will sometimes make a good animal, but when bred from again, the produce is uncertain, sometimes "taking back" on the long wooled parent, and sometimes on the opposite side; and when apparently combining in the fleece a united influence of the two breeds, a closer examination will show an unevenness of length and filament that ill suits the manufacturer.

R.

Maple Grove, Otsego, March 26, 1835.

For the Farmers' Register.

THE POLICY OF THE LAW OF ENCLOSURES DEFENDED.

Those who advocate the repeal of this law have fallen into an evident mistake, in supposing that the expense of fencing would be diminished by the proposed measure. A simple reference to the most approved method of stock management in some sections of our own, as well as in foreign countries, will be sufficient to satisfy any one that the successful prosecution of this branch of husbandry requires infinitely more fencing than is at present found in the greater part of eastern Virginia. The northern farmers, for instance, have, with a view to this subject, found it to their interest to divide their arable lands into a great number of small fields, comprising from ten to twenty acres each, separated from each other by permanent division fences. This arrangement is adopted in order to introduce the artificial grasses, by which their arable lands are made to answer the double purpose of grazing and tillage. (See Far. Reg. vol. I. p. 542.)

We find also that some of the most successful agriculturists in eastern Virginia have adopted a similar system. In answer to certain queries proposed by the committee of the Agricultural Society of Albemarle, Mr. John H. Craven states that he has five hundred acres under cultivation which are divided into ten fields of unequal sizes. This gentleman appears to be a successful raiser of stock of every description. His method of management as well as that of Messrs. Rogers and Meriwether may be seen by referring to the report of the committee. (See Far. Reg. vol. II. p. 226.)

The same system prevails in western Virginia, where it has been evidently copied from the northern practice. Even in those regions where live stock is the staple commodity, a similar practice obtains. We understand that hogs are raised in the western country by turning them upon clover lots and grain fields alternately. And even a portion of their corn crop in its succulent state is used in the same way. It is apparent that the use of division fences are absolutely necessary under such a system.

As it is the avowed object of the enemies of the fence law to contract the present amount of fencing (Far. Reg. vol. I. p. 396) it must of course be done by confining stock within as limited enclosures as possible. Take, for instance, an estate 400 acres of arable land, and let 100 be enclosed as a standing pasture. Upon this field all the stock necessary for the support of the estate are turned, hogs, horses, cattle and sheep. It is impossible to conceive the complicated disasters of such a scheme. In short, these standing pastures have been tried over and again, and as often abandoned, at least, as far as concerns the indiscriminate introduction of every sort of stock upon the same field. Those who use them at all, are compelled occasionally to turn a portion of their stock upon other fields, or upon the *woods range*—a resource of which they would of course be deprived upon the principles of the proposed plan.

It is true that great advantages would be obtained by making more enclosures; but it must be recollected that every additional pannel of fence is obviating the objection to the present law, in a geometrical ratio. For the sake of illustration, we will suppose that these 400 acres are in the shape of a square, or a parallelogram. The enclosure of 100 acres allotted to stock can be divided into three equal fields by running two division fences. It is easy to be perceived that by removing these and joining them again to the outside fence they can be made to enclose 100 acres more. Two additional fields of the same size will afford a sufficient number of rails to enclose 300 acres. And with seven, there will be enough to comprehend the whole 400 under one fence. And with this the objection would end. We have no doubt that such an arrangement of lots would be of vast importance in stock management. It would afford the means of introducing the culture of the artificial grasses, by which this branch of husbandry has been rendered infinitely more profitable than under the old standing pasture system. And we would remark that this is the plan recommended by the author of Arator, to whom the agriculture of Virginia is so much indebted.

The method of management is simply this: some of these fields will be sowed in small grain to be consumed by turning the stock upon it after it has ripened; or they may be harvested, and subsequently gleaned, as the individual thinks best. A similar system would be adopted with regard to the grass lots. Some will be mowed for winter consumption, others will be appropriated to grazing. And as these artificial grasses require two or three years to arrive at perfection, prudence will dictate the propriety not only of enlarging these lots, but of increasing their number as far as practicable.

We admit that where lands are devoted almost exclusively to the purposes of tillage (as they are undoubtedly with us) that fencing becomes a very heavy and unprofitable tax. But if it be the object of the agriculturist to make stock management a subject of profit, he becomes amply remunerated for any amount of fencing which may be thought necessary to promote this object. And here in fact is the secret of those rock fences which we hear of in some parts of the state—one mile of which would absolutely ruin a tobacco planter to build.

The idea that a portion of our arable lands were

to remain unenclosed has always appeared to me as a very preposterous one. In those countries where the law of enclosures is not known, and where fencing is infinitely more expensive than with us, their arable lands are all carefully enclosed. Conceive for a moment, a country intercepted in every direction by public roads, filled constantly with travellers and way-faring men. It would be impossible under such circumstances, to determine whether depredation, upon the unprotected crops of the country were the result of accident or design. A drove of hogs or bullocks would fill the country with consternation and dismay. The adoption of such a system would indeed be a happy contrivance for the drover. It would save him the expense of feeding his stock from the time he passes the Virginia border until he sells out. When the supplies on one route have been exhausted he will take another: and when the highways have failed, he will take to the byways. And after he has thus consumed the whole growing crop of the state, he will then sell his meat at his own price, to the very people at whose expense it had been fattened.

It would be in vain to talk of legal restrictions and penalties: they would have no other effect than that of throwing the charges incident to such restrictions upon the shoulders of the buyer. Or of putting a final stop to the importation of live stock.

We insist that agricultural reform calls for no legislative enactment. The existing legal policy throws no obstruction whatever in the way of the individual who sincerely wishes to place his stock management upon a profitable footing. And we feel constrained to condemn all such attemps on the part of the legislature as gratuitous and uncalled for; and as oppressive in the extreme to the whole body of small farmers who constitute so large a portion of the agricultural community.

The foregoing remarks were suggested by an editorial essay on the law of enclosures, in the March number of the Register. We concur fully with the author in the impolicy and injustice of giving legislative preference to any particular branch of industry. But when he asserts that the law of enclosures is of this description we beg leave to put in our humble dissent. This law says he "and its effects exhibit a striking example of the long continued operation of the preference given by our law to the business of cattle-raising at the expense of grain raising—of a preference of grazing to tillage." We think that by referring to the circumstances which have given rise to these laws they will be found to have their origin in motives directly opposite to those ascribed by the author.

It is a fact familiar to every tobacco planter at least, that the annual *clearings* which he finds leisure to make, are utterly inadequate to his immediate demands. We speak advisedly when we assert, that according to the practice which prevails upon tobacco estates no planter expects to release any part of his arable land until it has been cultivated at least eight or ten years in succession. We will explain the "*modus operandi*." And as the history of a single plantation will answer for that of every other, we will take, for instance, one of 500 acres, with a complement of ten hands. To each of these hands, the planter will assign 15 acres for annual cultivation; if he has a sufficient quantity of open land. The size of his whole crop will then be 150 acres; 20 of these are allotted to his tobacco, the remainder to his grain crop. All the newly cleared lands are invariably assigned to his tobacco, the first year they are cultivated: and where the lands are very good, they are tended in this crop at least three years in succession. This practice relieves the planter from the necessity of clearing land for his entire tobacco crop; which he cannot do, and tend a full crop of grain at the same time. Upon estates where a great portion of the lands have been opened, the annual "clearings" hardly ever exceed half an acre to the hand. But as our remarks have reference to rather an earlier period of operation, we will take it at a stage when they can accomplish at least a full acre each. At this rate then ten hands will be employed fifteen years in opening as much land as is allowed usually for annual cultivation. We have reduced the period to eight or ten years, because the three or four first years of settling a plantation are devoted almost entirely to the labor of clearing and fencing, as preparatory steps to the introduction of regular and systematic operations.

So then for the first ten years there is no open land to be spared for pasturage. By this time the fields that were first cleared are so much exhausted as to stand eminently in need of a little respite, if indeed they are not already irretrievably gone. In the mean time stock must be raised. During our earlier history the forest afforded an ample resource. Common interest dictated the propriety of enclosing all the arable land in order to secure the benefits of the *woods range*. And the legislature aimed at nothing more than to restrain the abuses to which the common worm fence of the country was liable.

But we will follow the history of the 500 acres farther, and see if there is any subsequent circumstance which can justify the inference of the author, that pasturage is preferred to tillage. We have seen that arable lands are consigned through necessity, to eight or ten years of constant cultivation. After this period, the three-field system is gradually introduced: viz. first year corn; second oats, or other small grain; third, rest, with pasturage: a system for a long time the boast of our agriculture, and the ultimate object to which the efforts of the planter were directed with the most anxious solicitude. It was indeed found eminently serviceable to stock raising, but it was ultimately discovered that lands deteriorated almost as fast under this system as they did from annual cultivation. Many planters, especially those upon thin lands, were therefore induced to relieve their lands altogether from the hoof, and to devote them exclusively to the purposes of tillage. And as a security against the temptation to pasturage whilst cross fences existed, they were removed, and the rails appropriated to strengthening the outward enclosure. A number of planters however still persist in the three-fie'd system. Others again have established standing pastures. But under every system yet adopted in the tobacco region, there is some radical defect which compels the planter to resort to the importation of live stock to supply deficiencies. This is a succinct but true history of agricultural operations, wherever at least the tobacco culture has been introduced. And we discover in every circumstance connected

with the subject a palpable preference of tillage to pasturage.

But there is another circumstance which goes most forcibly to strengthen this conclusion. Wherever lands are cheap, and agricultural products high, the people are disposed from principles of obvious economy to apply their labor almost exclusively to tillage. The enormous sums which the planters once received for their tobacco crops did for a time justify the neglect of every other subject of husbandry. It was indeed ripping up the goose for the golden eggs, but it was with a success the reverse of that which happened to the man in the fable. We may mourn as much as we please over our impoverished inheritance, but had our ancestors been so prudent as to have saved even a tithe of what they made by this land destroying system, we should have little cause to shed tears over their steril fields. In connection with this subject, we will advert to a capital mistake into which they very generally fell. The majority of people in every country either live up to their incomes, or beyond them. But the Virginia planter who consumed annually the proceeds of his crop had the misfortune to mistake a part of his capital for his legitimate income. But to such however, there were innumerable exceptions. Wherever the planter was actuated by prudent foresight, or love of money, his descendants have had no occasion to complain of barren fields or empty coffers. Indeed the wealthiest planters have invariably been those who have sacrificed every thing for tobacco, and left ruin and desolation in their rear.

It is true that the author speaks of the preference of grazing to tillage as a legal one. But he leaves us altogether in the dark whether he considers it as the joint voice of the people expressed through their representatives—or whether like the "Mesta" of Spain it has been the result of a spirit of monopoly and arbitrary legislation. The examples however with which he has thought proper to illustrate the subject, leave us to infer that he looks upon the law of enclosures in the light of the arbitrary edicts of a Spanish monarch.

In Great Britain and Spain as well as in all other European countries, the people are found divided into a great many powerful interests. And according as one or the other of these interests acquire the ascendancy in the national councils, the opposite one must suffer the effects of a selfish policy. But in Virginia we know no such distinctions. We combine in one character that of farmer, grazier, planter and manufacturer. And how the legislature could separate the grazing interest from the planting, we are unable to discover. The members of the Virginia legislature are chosen almost entirely by the agricultural interest. It is not reasonable to suppose that a body so constituted would have persisted in a system of local policy which daily experience proved to be inadequate to the object proposed.

Nor can the law of enclosures be regarded as an attempt on the part of the legislature to direct a portion of the labor of the state into a channel which would obviate the necessity of importing live stock—because this law had its origin at a period many years anterior to the establishment of the western states, to whom we now look for supplies of this article of consumption.

FENCEMORE.

REMARKS.

It is not the usage of this journal to bring forward in appended comments, editorial opinions, in opposition to any of different character maintained by correspondents—and though a more frequent resort to such comments has been more than once called for, it is still deemed most proper to leave every contributor free to speak, and every reader to judge for himself, of the various opinions and questionable points discussed. Whenever we have expressed objections to particular opinions, we hope that there appeared good cause for the exception, and that there was nothing in the remarks either disrespectful, or annoying to the particular correspondent. The adoption of a different course (although sanctioned by very general usage) gives an advantage to an editor, in controversy, to which he has no just claim: and still greater is this advantage made, when (as is also very common) a correspondent's argument is answered, or opposed, in *preliminary* editorial remarks.

Under the guidance of these general views, we should have submitted to the public the foregoing communication, without any accompaniment of our opposite opinions, and should have been the more inclined to pay that silent respect in this case, not only because the author well deserves respect, but also, because it is the first argument offered here in support of his side of the question, and therefore he is especially entitled to a clear field and "fair play." But as the writer has directed his strictures particularly to an editorial article, proper respect for him requires that we should depart from our usual course. Still it is not intended to discuss the general question.

There would be but little difference between our opinions as to the propriety of preserving the general principle of the law of enclosures in every such region as our correspondent describes, and which agrees very nearly with the general condition of Virginia in early times. No opponent of the law has objected to its early operation, nor to its continuance for any length of time that the same general state of things may continue in existence. The admission of the former good policy of the law was distinctly stated in one of the earliest arguments on this subject in Vol. I. p. 396, signed "*Suum Cuique*," and such we presume are the views of all. This removes all ground of controversy as to any region just emerging from the forest state; and therefore no farther observations on this head are needed.

But even for the cleared and impoverished portions of Virginia, (embracing, with some exceptions, most of the middle and low country,) our correspondent thinks the change of principle in the law would be improper, and that even if made, more fencing would be required by good stock husbandry than is now maintained. This part of the question we are in no manner required to discuss—and therefore shall pass it by, except to notice one or two mistakes, or omissions, which serve as part of the grounds from which our correspondent's conclusions are deduced.

It is readily admitted that a very high state of culture combined with grazing, and on very rich lands,

requires, for its *perfection*, numerous and good enclosures. This is one of the last steps in agricultural improvement—agreeing, in results, (from our then peculiar circumstances,) with the earliest and rudest state of tillage in Virginia. But to arrive at this *perfect condition*, embracing enclosures of every field, it is necessary that the durable materials for fencing should be sufficiently cheap—that the landmarks on which to build walls, or plant live hedges, should not be changed in every generation, or oftener—and above all, that the profits derived from grazing should be sufficient to compensate amply the additional expense of enclosures. None of these circumstances exist in our naked and poor country—and the whole rent of the country, taking rich and poor land together, would not pay for keeping it enclosed in 20 acre lots, as may be good policy in England, and even in some parts of the northern states. But as to the latter, (at least so far as we are informed,) it should be remembered that hogs are not permitted to range at large—and the fences may therefore be made at half the cost. A fence of three rails at most, in mortised posts, is ample protection against cattle—and fewer will serve with a ditch and bank. If hogs were thus confined in Virginia, half the oppression of the present law would be at once removed—and besides gaining that benefit, there would be more hogs raised in consequence of this restraint. We even suspect that our correspondent and his neighbors, abundantly as they are supplied with woods' range, would make more pork, and have less need to rely on the supplies of meat from western drovers, which he seems to admit to be now required.

But between the forest state of a young country, and the highest state of improvement of an old one, there is an immense middle ground, in which enclosures of every field, and even of every distinct property, cannot be profitably kept up—and therefore, in most countries, are wisely dispensed with. That is, the owners are secured against trespasses, and therefore are free to enclose, or not, as they please. Most of the arable land on the continent of Europe is still in this unenclosed state—and almost all of that which is not more productive than the average of eastern Virginia. Even much of the richest and best cultivated land is unenclosed, because divided into such small shares that a fence around each would be too heavy an expense to be borne. And though we will not here argue the question as to the superior share of benefit which the small or the large landholders enjoy in the law of enclosures, we will observe, that so long as that law may exist, it will be impossible for land to be held in Virginia in very small shares. The law is perpetually operating to starve out, deprive of their little freeholds, and to banish from Virginia, the valuable class of small farmers whom it is averred the system protects. It is as much the operation of the fence law to accumulate many small tracts in few hands, as it is of the law of descents (however beneficial this may be in general,) to divide these accumulations: and from the frequent changes caused by the two opposite operations, dividing landmarks, (whether between large or small farms,) cannot be expected to remain long enough to mature a live fence on, or to permit a clear profit from its being raised to be derived.

As applicable to this branch of the subject, we will take the liberty of copying some sentences of a private letter written last winter by a very intelligent gentleman, than whom, no individual would be deemed better authority—and who, in addition, is a resident cultivator of the tobacco region of Virginia, and where, it is believed, that the mode of tillage, habits, and other circumstances, either are, or were but recently, precisely similar to those in the neighborhood of our opponent. "You are right," says this gentleman, "in saying but little can be done in the way of improvement, till there is a change in our law of enclosures. The present law is dissected in a masterly manner in the Register, [No. 6,] and its absurdity completely exposed."———"You never said a truer thing, than that the poorer class was more interested in a change, than the more wealthy. There are hardly as many freeholds now as there were thirty years ago, and I verily believe that it is attributable to the present law. Small freeholds are amalgamated, brought under one fence and one owner."———"In my neighborhood there is thirty miles of fencing, and all to give to stock the benefit of promenading up and down a six-mile lane, where there is scarcely a blade of grass."

Having admitted fully the good design and policy of our law of enclosures, for the condition of the country when it was enacted, it will be unnecessary to disavow the intention of charging the present oppression to designedly partial, or worse than partial legislation. We spoke of the *operation* of the law, and not of the *intentions* of the legislators who enacted it. We never supposed that there was a deliberate design to sacrifice, or even to impair, the interests of tillage for the benefit of the interests of grazing, as a matter of general policy. But this effect is not the less produced because of its not having been intended—though (as formerly stated) without even the poor gain of benefiting the favored interest.

But however much we may differ from our esteemed correspondent on this question, we are pleased that he has come forward to maintain his opinions. It is proper that every question affecting the interests of agriculture should be fairly discussed in this journal—and none of its readers ought to object to a full expression of any honest opinion, however opposed to their own conviction.

From the Petersburg Intelligencer.

COTTON SEED OIL.

The Mayor and City Council of New Orleans have resolved to light the city with cotton seed oil. The Baltimore Patriot remarks "that the extensive experiment that is about to be made of the utility of this oil in New Orleans, will test its value, and if it should be found to possess the advantages ascribed to it, over the oil now in common use, it will, no doubt, enter largely into the consumption of every family, an prove an immense source of profit to the cotton growing portion of our country. It will in fact, be an addition, to the full amount of the oil, to their wealth, the cotton seed being now almost a useless article."

From the New England Farmer.

IMPORTANT FACTS TO BE OBSERVED IN REARING STOCK.

Mr. Editor—I have never seen in your work an account of M. Giron's experiments, which have brought forward some new and highly important laws, that regulate the form and sex of animals. A brief notice of them will be useful to all who are interested in improving stock.

M. Giron de Busareingues is an agriculturist in the south of France. His work contains two separate propositions, supported by experiments most numerous and satisfactory. The first is—that in animals of mature age and perfect developement, the influence of the sexes on the external form *crosses* in generation, the male being more like the dam, and the female progeny more like the sire. The second is—that in regard to sex itself, the influence is *direct*, the sex of the progeny corresponding with that of the parent which had the strongest constitution, and was in soundest health at the time of union.

The first of these propositions is deduced from an observation of a vast number of cases which cannot be detailed in this brief notice. After remarking then that they are sufficiently strong to convince every one of the correctness of the inference, I will proceed to state a few facts by which this second proposition is supported by M. Giron.

His first remark was, that, in his flocks and studs, those females who were at the most vigorous age, generally produced females whether united to strong or weak subjects: whilst those females that had either not attained, or had passed the prime of life, produced males when united to prime subjects, and females, when united to very old males. To ascertain whether this discovery corresponded with general observation among practical farmers, M. G. made inquiries of the neighboring agriculturists, who informed him that they had constantly remarked that when the male was young, and the female vigorous, the product of their union was female; while the contrary had as uniformly happened when the conditions were reversed.

In order to test this matter still further, M. G. announced, in 1825, to the agricultural meeting of Severac, that a part of his flock, already marked, would give him, at the next *agnelage*, more females than males. The society nominated two commissioners to ascertain the fact, and it turned out that the proportion of males to females was 1000 to 1472.

At a subsequent meeting M. G. offered to effect the production of a majority of males or females in a given flock, at the choice of the society. Two flocks were immediately furnished by members of the society.

The first flock was divided into two equal parts without reference to age or constitution. The first part being supplied with very young rams gave a product of 30 males to 76 females: the second part being supplied with strong and vigorous rams four or five years old, gave a product of 55 males to 31 females.

The second flock was also divided into two sections, but with more regard to the other conditions referred to. The first section composed of strong sheep four or five years old, was sent into rich pasturage and visited by yearling rams; it produced 15 males and 25 females. The second sections, composed of feeble sheep under four and over five years of age, was placed in dry pasturage, and received two strong rams over three years old; the result was 26 males and 14 females. In both experiments it was observed that the lambs produced by the young rams were equal in appearance to those produced by the most vigorous.

The experiments were continued on other classes of animals, birds and insects, with the same results. In the poultry yard, e. g. where the preponderance of maturity and vigor was on the part of the hen, there resulted 725 males and 1000 females: and where the male parent was most vigorous and of ripest age, there resulted 1415 males and 1000 females. Among horses his experiments were particularly clear and conclusive.

It happened to be most profitable to M. G. to have more females than males. With a view to this effect he took care, in the year 1824, to furnish his mares good pasturage, and to give none to foal who had suckled the same year or borne the year previous. "Elles ne furent presentées à l'étalon qu'apres qu'elles eurent donné des signes de chaleur." Five mares, thus prepared, produced five females; and of fifteen foals procured from 1824 to 1827 there were 13 females and two males. In accordance with the same law, it is generally true, I believe, that southern horses (particularly Arabian) produce most female colts when united to the more vigorous mares of a northern clime.

So far as M. G. extends his comments to the human race, they are not within the design of this brief communication, which is intended for the practical benefit of farmers. This benefit may be easily and plainly deducible from the above statements so far as they relate to horses and poultry. Permit me to allude to the manner in which advantage may be taken of *both propositions* in rearing *horned cattle*.

Suppose you have a cow that is a remarkable milker, and wish to procure from her a progeny with the same excellence. Now the *common* way is, to send the cow to bull, and if she has a *heifer* calf, it is raised with high expectations, and the owner is invariably disappointed. The reason of this is, as we now see, that the heifer calf partakes of the external form and peculiar properties of the bull and not of the cow. Proceeding then on the principle developed by M. G. we should do as follows: send the cow whose properties you value to a bull of the ripest age and greatest vigor. The product will be a *bull-calf* having the form and inherent properties of the mother, so far modified in their developements as the difference of sex required, but still inherently the same. This bull-calf should be carefully reared, and his female progeny will exhibit the form and properties of *his dam*.

So also if you have a bull of huge size, fine form, great strength, and other excellences, it will be in vain to expect similar form and properties in his immediate male progeny. But his heifer-calves will inherit his properties, and transmit them to their male progeny. Thus must we be content to pass through one generation, and we shall probably be well rewarded for our patience and perseverance.

It is scarcely necessary to add that such patience is not necessary in rearing horses. If you

wish to procure a colt of form and properties of a fine mare, send her to a vigorous horse, and the result will probably be a male, possessing the properties and form of the dam. On the other hand, if you wish a colt resembling a celebrated stud horse, you must send such a mare (either old or very young) as will be most likely to have, from this union, a female foal, for it is in this crossing of sexes we get the external form and properties we desire.

In conclusion allow me to express the opinion that the incredulity that exists among farmers about the possibility of propagating the qualities of animals, may arise from their want of knowledge of these laws. "I don't believe in your breeds of horses," says Farmer A. "There's my neighbor B. has as fine an animal as ever stepped, that came of his old black mare that's not worth a pin." Now if farmer A. had known as much as I wish to teach him by this paper, the fact he stated would not have led him to his skeptical conclusion. If the fine young animal was a female, it matters little what were the qualities of the "old black mare," the foal partook of the form and qualities of the sire, and so on.

Yours &c.

B, C.

From the Cultivator.

DRYING GREEN CORN FOR WINTER USE.

Several methods of drying unripe corn for winter use are recommended and may be practised with advantage. Probably the worst of these is the common one of boiling, and afterwards cutting the grain from the cob. The corn is not only deprived of much of its sweetness and flavor by the boiling, but the best, though not the largest part of the kernel, the corculum, or as it is called by the farmers, chit, is left on the cob. A far better plan is that adopted by the Indians of Lake Michigan, who roast corn in a sand bath heated by a fire which they make on a bed of soft sand, into which the ears are plunged. After being roasted in this way, it is removed from the cob and kept in sacks for winter use.

A neater and still better method is, to put the ears of green corn into a baker, or oven of any kind, and roast them about as much as you would do for immediate use. The corn is then shelled, and spread to dry for a few days, either in the open air or a dry room; and may be kept for years. When thoroughly boiled (for at least 12 hours) it is as tender and soft as green corn, to which in flavor it is in no way inferior, and constitutes a most admirable ingredient in soups, or if eaten by itself is one of the most delicious and wholesome dishes that can possibly be prepared.

EDWIN JAMES.

From the Boston Transcript.

TRANSPLANTING A LARGE TREE.

The jingo tree which grew on the estate of the late Gardner Greene, and of which we spoke the other day, has been safely removed to the common, where it is to be planted. It is probably the largest tree ever transplanted in this vicinity, being 40 feet high, and the circumference, at 3½ feet from the ground, four feet four inches. The labor of transplanting it was undertaken by Mr. Sheridan, formerly gardener on the estate. The earth was carefully removed from the roots and the tree lifted by shears and tackle from the ground, sufficiently high to pass under it a low wheeled drag. The roots were then carefully covered with matting, and the tree lowered upon the drag, on which it was easily supported in an upright position, being kept from falling by ropes attached to the top and held by men who walked along with it to its destination. Mr. Sheridan tells us that there is not the slightest doubt that it will live and flourish in its new location.

From the Genesee Farmer.

MANGEL WURTZEL OR FIELD BEET.

A few remarks on the culture of this crop, now the season has arrived for commencing it, may not be unacceptable.

The soil

Is best when a clayey loam; but any soil if ploughed deep and well manured will produce good crops, as the principal requisite is depth and fertility.

The sowing

Should be done in the early part of the present month, although it is frequently performed later. Where the ground is very moist it should be sown upon ridges; but in ordinary cases, it succeeds best when planted in drills without ridging. T. and H. Little, of Newbury, Massachusetts, who raised upwards of thirty-three tons to one acre, prepared the ground and sowed in the following manner:—after one deep ploughing, the ground was furrowed two and a half feet apart, and the manure put into the furrows, and covered with the plough; a roller was then passed on the top of the ridge thus formed, to pulverize the lumps, level the surface, and press the soil and manure together. The seed were then dibbled with the finger over the manure, about six or eight inches apart. John Hare Powel sowed his crop thus:—"the holes for the seeds were made by a wheel, containing pegs in its circumference, which penetrated the ground about an inch, leaving intervals of four inches; the rows were made two feet asunder; two capsules [or berries] were dropped in each hole; the wheel of a common barrow was then passed over them, thus compressing the earth, and leaving a slight rut for the retention of moisture."

The quantity of seed

Per acre should be about four pounds; for although this is a large allowance, the expense is small when compared with the insurance of an even crop. Great care should be taken that the seed of the common red and white beet is not mixed with it. Unless the ground be very moist, the seed, before sowing, should be soaked about 48 hours in soft water. After the plants have come up, they should be thinned to about eight inches distance from each other in the rows.

The after culture

Consists principally in a free use of the cultivator, and in keeping the land perfectly clear of weeds. Col. Powel ascribes his success in the

culture of this crop, to deep and thorough ploughing; to the use of cultivators, which complete the production of fine tilth; to the destruction of weeds on their first appearance; to leaving the smallest space upon which a horse can walk between the rows; and above all, *to planting the seeds of a proper kind upon a surface which is kept perfectly flat.* Gideon B. Smith of Baltimore, in 1832, planted one-sixth of an acre which had been intended for early corn, and had been manured the previous year. The seed were sown in drills two feet asunder, and eight inches apart in the drills, and covered as corn. When the plants were up, a weeding hoe was passed over the field, and afterwards a small plough run through it twice, clearing out the weeds with a hoe. This was all the cultivation it had; and the whole labor, including the original preparation of the ground, did not exceed two full days' work for one man. The crop was upwards of seventy-five bushels; and might have been much larger, as there were many vacant places of six or eight feet length in the rows; and other places where the roots were injured by being crowded. The soil was a fair medium mould, a mixture of clay, sand, and vegetable matter.*

The produce per acre,

Under ordinary culture, may be estimated at from six hundred to a thousand bushels. Where however the ground is ploughed very deep, well manured, and well cultivated, much larger crops have been obtained, of which a few instances are here given.

Gideon Foster, of Charleston, Middlesex county, Massachusetts, raised forty-three tons to the acre.

The premium crop of Tristram and Henry Little of Newbury, Mass., was 33 tons, 10 cwt. and 14 lbs. to an acre, or *more than fourteen hundred bushels.*

Col. Powel enclosed certificates to the president of the Pennsylvania Agricultural Society, showing that *sixteen hundred and thirty-four bushels* of mangel wurtzel, weighing seventy-eight thousand four hundred and forty-eight pounds, were produced upon an acre and fourteen perches; and a part of the same field containing thirteen contiguous rows, produced at the rate of *two thousand and sixty-five bushels per acre,* weighing 44 tons, five cwt. and 27 lbs.

Henry Thompson of Baltimore, raised in 1833, on less than one-eleventh of an acre, five tons, 14 cwt. and three qrs., or at the rate of about *sixty tons to the acre.*

In good land, single roots of the mangel wurtzel often weigh nine or ten pounds, and sometimes even *fourteen or fifteen pounds each;* and J. A. Kenrick of Newtown, Mass., raised in 1833, a single root weighing no less than *thirty-six pounds.*†

These products are enough to show what may yet be done in the cultivation of this crop, and present strong encouragement for the enterprize and experiment of farmers of western New York, where it has hitherto received comparatively but little attention.

Uses.

This root is admirably adapted for feeding nearly all domestic animals. It is the best of known food for store swine; and swine fatten upon it, yielding firm pork of good flavor, when fed to them raw, equally well as upon boiled potatoes, by which the fuel and labor of boiling is saved. Col. Powel says, "my neat cattle prefer mangel wurtzel to any other root which I have offered to them. I have found its effects in producing large secretions of *good* milk, very great. * * * Its application as food for sheep is not the least important of its uses. Ewes yean usually at the season when grass cannot be supplied. The health of themselves and the thrift of their lambs, essentially depend upon succulent food being had. I am inclined to think that no small portion of the success which English breeders have met, is to be ascribed to the large stores of roots, which they always have at command."

In autumn, when the quantity of milk from cows often diminishes greatly, it may be restored by cutting the leaves of this plant and feeding them. In some instances the quantity has been doubled by this means. The leaves soon grow again, and may be cut every fortnight.* Cows fed twice a day in winter, upon 20 pounds of the roots at a time, together with four or five pounds of hay or chopped straw, will, it is asserted, give as much milk as in summer.

In some instances when fed to cattle and sheep, this root is said to have produced *scouring.* This may be owing either to the soil adhering to the roots when eaten, or to the sudden commencement of feeding on them exclusively, instead of their being mixed with a proper proportion of dry food, such as hay, meal, or chopped straw.

This crop has several important advantages in its cultivation. It is little affected by changes of the weather; suffers little from drought; thrives in most soils; is not attacked by any insect; and prepares the ground well for succeeding crops. The roots may be kept sound and fresh for eight or ten months.

Farmers who value their land, would find it greatly to their interest to direct their attention more to the cultivation of this crop. It has been found that two tons of mangel wurtzel are equal to one ton of hay for feeding milch cows; and that three tons are equal to one of hay for feeding cattle in general. Any one may readily calculate from this, how much greater a number of cattle may be supported by this means, from a given quantity of land, than by the usual mode of feeding them exclusively on grass and hay. Supposing for instance that thirty tons of mangel wurtzel are the average product per acre, then we shall have an amount from one acre alone equal to from ten to fifteen tons of hay. Now if a method should be devised for raising this amount of hay from an acre, it would excite universal attention and inquiry; but this crop, although possessing advantages not less important, is almost entirely neglected.

* Amer. Far. vol. XV. p. 25.

† New England Farmer.

* It is probable however that this production of new leaves is in a greater or less degree at the expense of the root, although very large crops have been raised where this course has been pursued.

From the Journal of the Franklin Institute.

DETECTION OF ADULTERATIONS IN FLOUR.

M. Dubuc, senior, of Rouen, has applied himself with success to the detection of farinaceous mixtures in wheaten flour. The principal substances with which flour is adulterated are potato starch, a fecula; beans, barley, chalk, plaster of Paris, &c. An extract from his memoir is published in the last Bulletin of the Society of Encouragement, from which the following is taken.

There are two methods of detecting adulterated flour, mechanical and chemical. In France the adulteration is principally with potato starch, as it renders the bread whiter and heavier. If there be more than ten per cent. of potato starch, it may be detected by the naked eye, or with the aid of a magnifying glass; the fecula is whiter, the particles are angular, and reflect the rays of light, like minute crystals. To render the discovery more easy, M. Dubuc dries the suspected flour in a sand bath, at 100° to 110° of Fahrenheit; and then, with a good magnifying glass, so small an adulteration as five per cent. may easily be detected.

But if the miller has been cunning enough to grind the potato starch with the wheat, other means of detection must be had recourse to.

The first is, from the great difference between the specific gravity of wheat flour and potato starch.

The second is, that flour contains a certain per centage of *gluten*, and the starch does not contain an atom of gluten.

First method.—A vessel that will contain one pound of flour, gently pressed down, will contain a pound and a half of fecula, from these data the relative portions of flour and fecula, in any parcel of flour, may be easily ascertained very near the truth.

Second method.—The best flour contains about twenty per cent. of gluten, and, as we have stated, the starch not an atom.

Experiment.—Take five ounces of pure wheat flour, and two ounces and a half of warm water; mix and work it well for about ten minutes; the paste will be firm and elastic. Let a little warm water fall continually upon it, while you continue to knead it; by this means, all the starch and saccharine mucilage will be extracted. The operation is finished when the water flowing from it ceases to be white; what remains is gluten, the weight of which will be about one ounce. If the flour be adulterated, the paste will be more liquid, less cohesive, and less elastic, and an intelligent baker will soon be able to discover to what extent the flour has been adulterated, from the appearance of the paste, &c.

Such are the mechanical means that may be employed with success.

Employment of chemical agents to discover frauds in flour.—It will be well to bear in mind, that wheat flour is an animalized azotic matter, (*matiere animalise azotée,*) and that, on the contrary, fecula, or the starch extracted, pure from cereals, is entirely of a vegetable nature: from this difference results the varied effects of the re-agents employed.

The three chemical tests which have been found best for general use, are nitric and muriatic acid, and the liquid nitrate of mercury, *(deuto nitrate.)* Their chemical effects on flour and fecula are as follows:—

1. Nitric acid has the property of coloring wheat flour of a fine orange yellow, whereas it neither affects the color of fecula nor starch.

2. Pure muriatic acid colors good wheat flour of a deep violet, but dissolves fecula and starch, and forms with it a light, colorless, viscous fluid, decomposable by alkalies.

Experiments with nitric acid of 40°.—Take 100 grains of pure wheat flour, pour on it 100 grains of nitric acid, (aqua fortis,) in a small earthen or China cup, stirring it with a glass tube, it will heat a little, and in a few hours it will change color from yellow to a fine orange color.

Take 100 grains of fecula, and pour on it 100 grains of nitric acid; heat it in every respect the same as above, but no caloric will be evolved, and the mixture will not change color.

Take of flour 80 grains, and of fecula 20 grains, and of acid 100 grains; mix well; the color will now be much paler, and of a light citron color. Take 50 grains of flour, and 50 grains of fecula, and 100 grains of acid; mix well; the color is now much paler than before, so that, with a little practice, the quantity of fecula may be detected by the greater or less intensity of colors.

Experiments with muriatic acid of 21° *of strength.*—Take of wheat flour and acid, each 100 grains; mix well; the color will become at first red, then violet, and finish by becoming of a beautiful indigo color. This operation is accelerated if a gentle heat be applied.

Take 100 grains of fecula, and 100 grains of acid; the mixture is at first of the consistency of paste, and then becomes liquid; the fecula is dissolved, and the solution *colorless.*

On varying the proportions of flour and fecula, we shall soon be able to ascertain the quantity of fecula in a sample of suspected flour.

Experiment in the liquid nitrate of mercury.—Take of flour and nitrate each 100 grains; mix well with a glass tube or rod. The paste will at first be of a pale citron, then reddish, and in three hours will become a full red. The color is permanent.

Take 100 grains each of fecula and nitrate; they will not combine, nor will the color of the fecula or starch be acted upon.

By mixing flour and fecula in different proportions, and observing the colors, we may soon be able to detect the proportions in which flour is adulterated by fecula or starch.

It may also be observed, that fecula absorbs less water than flour, which affords a ready means of detection.

The adulteration with bean or pea flour may be detected by pouring boiling water upon it, which developes the peculiar smell of these two substances.

We may add, that the adulteration with chalk, or gypsum, may be detected by pouring a diluted acid on the suspected flour, as an effervescence will take place, and carbonic acid gas be disengaged.*

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* There will be no effervescence from adding acid to gypsum (if it is pure,) and therefore this as a test for gypsum, is worthless.—Ed. Far. Reg.

From the Baltimore American.

VALUABLE MARBLE.

Beautiful statuary marble, said to be of the finest texture and of snowy whiteness, has been discovered in the neighborhood of Lynchburg. In some places it runs into the *verd antique* variety "in some specimens of the latter variety, the prevailing color is a cheerful green, agreeably blended with clouds of white so as to give it a fine floculent appearance. Some specimens of the white variety are highly translucent."

From the Norfolk Herald.

A SWIFT STEAMER.

The new steam boat Thomas Jefferson Capt. Henderson, left here on Monday morning at six o'clock, for Richmond, with passengers, and returned in season to leave again the next morning (yesterday) at the same hour! This is the first demonstration that has been given of the practicability of going from Norfolk to Richmond and returning on the same day. * * * * The distance between Norfolk and Richmond, by water, is computed at 150 miles, and as the Thomas Jefferson stopped six hours in the 24 which intervened between her time of leaving here on Monday and Tuesday mornings she run 300 miles in 18 hours; very nearly equal to seventeen miles an hour.

ON PUTRESCENT MANURES—J. M. G. IN REPLY TO J. B.

To the Editor of the Farmers' Register.

In looking over your April No., which reached me only a few days ago, I was sorry to perceive that your well informed and estimable correspondent J. B. had not taken my jocular remarks on certain parts of his former communication in quite as good part as I hoped he would—and as I was perfectly willing to take any he might make. To this conclusion I am led from his representing them as "much ado about nothing"—"word-catching-criticism"—"jeers and flouts," &c. But these little acidulated effusions are blended with so much laudatory remark on my character, style, &c.—that I should be a great churl indeed, if I could find in my heart to retort in a similar spirit.

It seems proper however, that I should notice a few passages in his communication wherein he appears to misunderstand some parts of my former letter, and may cause others to do so; while he gives to other parts an interpretation, of which they are not, I think, fairly susceptible. For example; although he does me full justice, in ascribing to inadvertence my using the terms "*not understood*," instead of "*misunderstood*," in my quotation of his italicised sentence; yet he labors through nearly a whole page to prove that this sentence would have been quite defensible had I not made the mistake. I readily admit there is some difference in the meaning of the two terms; but cannot, for the life of me, perceive, how it can be more proper to assert that "a fact *misunderstood* is not a truth," than to say, that "a fact *not understood* is not a truth." *The truth* of a fact can never, by possibility, depend upon either circumstance, although *its utility* certainly does depend upon its being *well* understood: not so much however, on a thorough comprehension of its cause, (for of that we may be utterly ignorant,) as on a perfect acquaintance with the various methods of applying it to use. I may therefore say of our friend's hard struggle in defence of his own term, as Swift did of the contest about the merits of the two foreign musicians—

"Strange! all this difference should be,
'Twixt tweedle dum and tweedle dee!"

But if J. B. is satisfied with his share of this "word-catching-criticism," as he has been pleased to style it, I am perfectly content, so far as he and I are concerned, to take my leave forever hereafter, not only of that entire class of facts which he deems "*not truths*"—but likewise of our "raw meat and vegetable" discussion—of all our little "corn-stalk chimneys," either with or without "vent," "throat," "flue," "shaft," &c.—of "Nebuchadnezzar's grazing," and, though last not least, of J. B's. own happy parallel case of "Jonah's" sojourn in the fish's belly. I am willing to go still farther, and include among these "noli me tangere" topics, whatever else *he* may deem an affair of "much ado about nothing."

A few remarks more and I have done. J. B. has misapprehended several of my observations and opinions in regard to manures—their application—their waste, &c. So far as they are theoretical, I did not presume to offer them as of any value, but merely as speculations of which others possibly might make some profitable use. Still as I *have* advanced them, it seems proper to make them plainer if I can, where it appears that they have been either "*not* understood" or "*mis*understood." As to my facts, if J. B. or any other person can make a better use of them, than I have done, they are not only welcome to do so, but I shall rejoice at their superior success: for I have no particular ambition to be either the first discoverer or the best user of any thing.

The first of my opinions which he seems to misunderstand, is that in relation to ploughed and unploughed summer cow-pens. My belief in the former proving less productive than the latter is founded—*not on the supposition* that "the earth cannot retain" all the products of fermentation really congenial to her; but that when they are ploughed under to a depth below the ordinary range of the roots of such plants as we generally cultivate, such products of fermentation *remain there*, and consequently can do no good to the roots above their reach. These, it is now believed, by all who are best acquainted with vegetable physiology, have no other means of obtaining their proper food from the earth, but by little sponge-like substances—hence called "spongioles," at the extremities of each fibre, which food must first be so diluted with water as to come in contact with and be absorbed by these spongioles. To *this* circumstance, in my opinion, is attributable the apparent difference between the produce of ploughed and unploughed summer cow-pens. According to my supposition, *all* the products of fermentation which the earth is capable of receiving and retaining, will be retained in both cases; but from pens immediately ploughed, they will be retained too low beneath the surface for feeding the roots of the cultivated plants; whereas, from unploughed cow-pens they will be carried by rain

no lower than they ought to go: the first is man's process—the second that of *nature*. As to what is usually called "the waste" of manure by fermentation, my conjecture, (for it is nothing more,) is, that the atmosphere takes up all which the earth cannot take, and restores it, after proper elaboration, by its natural conductors—rain, dew, and gaseous vapor. Could the whole which is drawn up from a particular quantity of manure, return exactly to the same spot first covered by the manure, or to the growth thereof, no waste, I think, would ever be suspected. But after assuming a gaseous form and becoming an aeriform fluid, its diffusibility is so great that it spreads over a much wider extent; some portion to be absorbed by the low plants near the surface of the earth, while the rest supplies food for the leaves of the fruit and forest trees. In this reciprocation, *nothing is wasted* in any sense, but all alternately given and restored—not exactly in equal proportions between so many given square feet of earth, and an equal volume of square or cubic feet of atmosphere; but the earth, as a whole, receives back the whole of every thing which the atmosphere draws from her, and which, through her, is designed as food for her vegetable productions. These remarks are here offered as explanatory of those in my former letter, which J. B. seems to have misunderstood: but *here*, as *there* I offer them merely as conjectures.

Another of my opinions which he has evidently misconceived, and from which he, of course, draws an unsustainable inference, is in relation to the restorative power of nature in fertilizing by means of leaves and other putrescent vegetable matter, worn out lands, or in making rich those which she herself had first made poor. From what I actually did say on this subject, he erroneously concludes, that "upon my theory," (as he calls it,) such "virgin wood-land" as he supposes "I may own, or am acquainted with in lower Virginia"—of which I am sorry to say there are thousands of acres—"too poor to be worth clearing or cultivating." would become as rich in about "four thousand years, as the Mississippi bottoms, or at least, as rich as it is possible for dry land to be made by putrescent manures." Now, it so happens that "*my theory*"—if he will make me the author of one, warrants no such conclusion; although—strange to say, there is a passage in his own former communication, which either does warrant it, or something that is cousin-german to it. Here it is, verbatim et literatim: "*Fortunately however, for the fertility of the earth, bountiful nature offers to the soil much more than it is deprived of by fermentation: and however great may be the losses sustained, still the gains are far greater.*" Should I not therefore have expressed myself clearly on this subject, let me make another effort to do so, lest the ingenious power of inference be brought to fix upon me theories which I have never either expressed or entertained. My belief is, that on such "virgin woodland" as J. B. describes—indeed on all virgin wood-land, the annual deposites of leaves and dead wood, do nothing more than *restore* the quantity of nutritive matter drawn from the earth by the growing trees and other plants; and that neither four thousand nor an hundred thousand years would make any of these virgin woodlands at all richer than in their original state, when first covered with wood. If this, *my* supposition, and not the theory of J. B. gives me by inference, cannot be reconciled to what he states to be "the known facts," and which I admit to be such, let it e'en travel the same road with his own dismissed sentence concerning "facts" that are not "truths."

In another place he charges me with treating "the manuring process of nature" "according to my theory" "more as a question of morals than of chemistry." If I really have done so, I must take shame to myself for being in the situation of the man who had been talking prose all his life without knowing it: for verily I cannot even conceive how a question of morals could possibly be manufactured out of such a case. But if I have unwittingly achieved this feat, I hope and trust my readers will award me due honor for it. In furtherance of this novel charge J. B. proceeds to say of himself "*I* do not treat the earth and atmosphere as "sentient and moral things;" nor do I decide by the measure of the moral wrong, or by the enormity of thus preferring against nature a "slanderous charge of grand or petty larceny" committed on the earth. *I simply refer to these facts, of the annual additions for countless ages of fertilizing matter, and that scarcely enough has been fixed in the soil to redeem it from sterility.*" As to the "*jeer*," (if he will pardon me for using his own term,) conveyed against myself in the foregoing sentence, I leave it to our readers to do what they please with it. But I beg leave to call their attention particularly to the underscored words of my quotation, and to contrast it with the sentence quoted above, from his former communication. In *that*, he positively asserts that "bountiful nature offers to the soil *much more* than it is deprived of by fermentation; and *however great may be the losses sustained, still the gains are far greater.*" In the one just given he says, "of the annual additions for countless ages of fertilizing matter," (on poor virgin woodland,) "*scarcely enough has been fixed in the soil to redeem it from sterility.*" *I* should call this a case of J. B. versus J. B., but shall leave it to *others* to designate it as they may choose.

Here ends, Mr. Editor, my attempts at explanation and acquittal. But I cannot take my leave without assuring both you and your worthy correspondent J. B. of the real esteem I feel for his talents, and character also, so far as I can infer it from his writings. I can truly affirm what I formerly said of his two communications—that I think them both interesting and valuable. Their intrinsic merit I deemed quite sufficient to secure them against being harmed, in the slightest degree, by a little jocular criticism, written in perfect good humor, and with sentiments of respect for their author. Although it is not probable that J. B. and myself shall ever again write either *at* or *to* each other, in your paper, yet it might happen. It may not therefore be amiss to say, that should it be so—as *he* seems utterly averse to every thing which even savors of a jest "in *an agricultural journal*," *I* shall endeavor to write (provided the subject be agricultural,) with as much gravity as if I were treating about the death, inhumation, and decay of human bodies, instead of the accumulation, use, and destruction of putrescent manures. A fugitive from the cave of Trophonius himself shall not surpass me in abstinence, either from laughing myself, or attempt-

ing to make others laugh: for although I myself could never perceive any good reason why a writer on almost *any* subject, should not step a little on one side, out of the beaten track, in search of a modicum of innocent mirth—seeing that there are so many more events and circumstances in the world to make weeping than laughing philosophers; yet I am perfectly willing to conform to the lawful humors of others in all matters between them and myself. Hence I will apply to our intercourse, without scruple, that favorite proverb of Sancho Panza's; "*when you are at Rome, do as they do there.*" If grave—close-to-the-point-language be the order of the day with *them*, it shall certainly be so with *me*, as far as my nature will allow me to make it so: and, like Bottom the weaver, in Shakspeare's "Midsummer Nights' Dream," I will always at least strive to be prepared, "to roar ye—an it were, as gentle as a sucking dove."

To laugh, and where few other persons perhaps, can see any good cause for it, is with me, I fear, a natural instinct; and *this*, every body knows, is hard to overcome. When therefore, provocatives fall in my way, I must either hide, or abstain from writing; otherwise the offence is almost sure to be committed, in person or in print. I call it *offence*, and I think, *properly;* for although all men enjoy the laugh of others when *with* them, yet not two probably in a thousand can even tolerate it when it is *at* them—however just and equitable this "give and take principle" certainly is. Yet with this fact constantly before me, I find myself too frequently transgressing. My only excuse—if it be any, is, that I am always perfectly willing for others to take the same liberty in this *respect* with *me* that I take with *them*. Bar ill-will, malice, and crimination of motive, and they may laugh and ridicule to their heart's content—they cannot offend me.

J. M G.

April 24*th*, 1835.

CLOSE OF THE DISCUSSION.

The foregoing communication was accompanied by a private letter from our correspondent, which stated that he did not intend to continue farther the discussion with J. B., whatever might be the reply: and as we knew that J. B. had before resolved on the like course, we thought it best that our readers should be informed on this head as well as ourselves. For this purpose, and also to guard against any improper inference being drawn as to the feelings with which either of the writers abandoned the contest, we thought it right that J. B. should have an opportunity forthwith to express to the public what we had the best reasons to know that he thought, and had before expressed on this subject, in private: and having read the foregoing, he has answered our expectations on this head in the following note.

To the Editor of the Farmers' Register.

I shall adhere strictly to my previous intention of not proceeding farther in this discussion, notwithstanding the temptation now felt to explain my meaning as to a passage of mine which your correspondent quotes, as involving contradiction. It will therefore be left to its fate. But I wish to take leave of my highly esteemed antagonist with some expression of those kind feelings which have not in the slightest degree been chilled by any thing in our controversy, and to declare to him that he is altogether mistaken in attributing any of my phrases to peevish or angry feelings having been excited. Indeed, it was really and honestly my belief, that I had avoided every thing but strictly defensive warfare—and even in that course, had not availed myself of the full extent of his invitation to make as free with him, as he had done with my piece. If then my words bore any appearance different from this opinion, it was contrary to my intention, and to the respect sincerely entertained for J. M. G. But I will say no more on this point, lest while thus offering my hand in peace, I should provoke a quarrel, like that of Sir Peter Teazle and his lady immediately after their loving reconciliation, produced by inquiring which of the two had previously given the first provocation.

Neither did I mean to express, (as J. M. G. supposes,) nor do I entertain the slightest objection to this, or any other suitable subject, being discussed in the vein of humor which J. M. G. indulges in with such good effect—and I have often joined heartily in the laugh, and not the less in the recent cases, when it was at my own expense. The objections expressed in my general remarks, were intended to be opposed to the sharpness of personal controversy—and not to the jocularity proceeding from good humor, and calculated to prevent, or allay, rather than to excite angry feelings, Long may J. M. G. indulge this vein—(of course properly directed—) and when he has—as is his usual good fortune—the "laughers on his side," I shall doubtless, be generally one of the number.

J. B.

SALE OF VIRGINIA LANDS, IN LONDON.

The following article is from the London Courier of March 26th, and is now passing through the newspapers of this country—and without comment, so far as we have yet observed.

"An important sale of freehold American lands in the state of Virginia took place on Wednesday, in the Auction Mart, which was crowded to excess with a highly respectable company. Mr. George Robins, in an able and elaborate statement, detailed the property, which was illustrated by maps and drawings. It comprehends a portion of 50,000 acres of carefully selected lands, purchased some years since under advantageous circumstances, out of 1,800,000 acres. The land is almost exempt from taxes, and the state of Virginia unencumbered by any public debt. The legislature of Virginia has recently passed an act for a rail road passing through the lands in question. The selected lands were divided into portions of various sizes from 50 to 100 and 200 acres, each of which possesses the best timber suitable for the building of houses, fences, ect. The yearly average produce of an acre of land giving from 60 to 72 bushels of Indian corn, is net in cash from £1 2s. to £1 5s.; and varying in quality from 40 to 50 bushels, from 16s. to 17s 6d. The tobacco crops are very productive. The country abounds in iron, lead, and coal mines, and Mr. Robins urged the important benefits to be derived from purchasing largely in this "the land of promise." The tiths and poor rates, were unknown in Virginia; wages were comparatively nothing. Upon a farm of 600 acres, the taxes did not exceed six shillings. The fee sim-

ple of one hundred acres of the best quality of land, which in this country would consume £5000 or £6000 might at this sale be obtained for less than £300. The lands were submitted in 91 lots—the first division, 7,265 acres in the county of Logan; the second, 2,517 acres on the waters of the Spruce Fork of Little Cole River. The first parcel, containing 600 acres of land, the yearly average of taxes upon which is about 5s. a year, was knocked down for 1,450 guineas. The above lot may serve as a criterion for the whole of the 47 that were submitted. The lots unsold, Mr. Robins said, were open to private contract, amounting to about five thousand acres in various farms, from 50 acres to 500 each, and will be sold by auction in London, on 15th April, in case any of them remain unsold."

It is certainly *possible*, that land as productive and valuable as that described above, and even in the county of Logan, may have been offered for sale across the Atlantic, where its worth could only be learned from the interested description of the proprietor, and the proverbial and licensed exaggerations of a land auctioneer. But it is at least highly improbable that any good land should be offered for sale under such circumstances. Land worth purchasing would naturally be offered to those who knew something of its value. The mere general statement of this transaction gives good ground to suspect that the "favorable circumstances" under which these lands were purchased, were, that they formed part of the millions of acres (real and imaginary) that have been sold by law in Virginia, for payment of taxes due thereon, according to the tax lists—and of which the greater part, if sold at a cent an acre, proved a dear bargain; but which more often, found no bidders at any price. In many cases, such delinquent lands had no existence, save on the books of the commissioners of the revenue—or if really existing, and even so well known that the purchaser will have no difficulty in finding them, consist of barren mountains, willingly perhaps forfeited by former owners, because not worth paying any tax on whatever. If this should be the result as to the buyers in this case, they will not be the first Europeans who have been thus duped, and thereby ruined—who have come to this "land of promise," believing themselves already rich, and found themselves paupers.

If there was no other objection than thus giving ground for such frauds, where our laws and usages are not known, it would be enough, for the sake of national character, to guard against the recurrence of such modes of collecting (or attempting to collect) the arrears of land taxes. It is true, that except poor foreigners, (who cannot understand that a deed executed for 5000 acres of land, by a public officer, under the commonwealth's authority, duly authenticated, and wanting in nothing of legal form, should refer to land not to be found, or held by some better right—) but few people would have been cheated by buying delinquent lands, at any price. But if there has been any benefit from the laws on this subject—any net gain to the treasury even—for all the legislation and all the complicated procedure on the subject—we are ignorant of any such results. The cost of legislation on delinquent lands, and of fees to legal officers for sales, executing and recording deeds, &c. have alone cost more than all the value of the forfeitures of land to the treasury: and where individuals have made purchases of real value, it has been often akin to fraud on the ignorant owner, and caused by the general fictitious state of these dues, and sales—the vast amount of such charges, and the complication of the whole matter, —all serving to conceal the few facts among the multitude of fictions and errors.

It is not intended here to attempt the explanation of a system of measures which it is believed that very few, if any, understand, unless some public officers who have been many years engaged in executing the various laws continually superseding each other on this subject. But it may be of some use to show that it is not an intended fraud—though the result is the same—on the part of the government of Virginia, when land is sold under state authority, with every apparent security for the reality of the whole transaction, when in fact no such land can be found.

The vast accumulation, on the public lists, of land returned as indebted for tax, and finally sold by law, was not so generally caused by the tax being actually due, as by errors on the lists, which were continually added to, by the ignorance or neglect of proprietors, and the neglect, and sometimes frauds of the different officers who either listed, or collected the taxes. If A sold his land at various times, and in several parts, to B, C, and D, and then moved out of the state, each of the new purchasers had so many acres entered to himself on the tax list, without caring that A's balance was stated correctly: and if the commissioner was not very careful, and also well informed as to the transaction, when A had no balance left, and had left the state, a part, or perhaps the whole of his original tract would still stand on the list, and be returned every year delinquent for 20 years, and at last be sold by law, when in fact he had no land, and what had been his, had been regularly paid for by the owners. For this and other causes, there was an immense amount of what appeared as land on the tax lists, and which was sold by law without any other mode of designation, and for which deeds were drawn and recorded, that had no existence. The only consolation of the purchaser in such cases, was that he had ventured in a lottery and had drawn a blank—having given perhaps $10, for the chance of finding 1000 acres. But this is a very different situation from the poor duped foreigner who may be the next purchaser, and who relied on the faith of the government for the real existence of, and his indefeasible right to the land.

Within a year or two after the first and great sale of delinquent lands in Virginia, a like sale took place for taxes due to the federal government: and all the real but unproductive lands that had been sold on account of neglect of their owners, by the state, were very sure to be indebted to, and to be again sold under authority of the federal government. In this way, if the purchaser under the first sale bethought himself, after waiting some years, to go to look for his estate, he might find it held by a new owner, who had profited by *his* neglect, as *he* had done by that of the first possessor. Or if years elapse, (as often was the case) after buying an immense number of acres, before travelling to seek them, it might happen, that the original and hereditary possessor, the purchaser under the state law, and the second purchaser under the federal law,

might meet, and each one only then discover for the first time that he was not the undisputed owner. But such difficulties have rarely occurred, and perhaps more than from any other reason, because the lands were found to be either in the moon, or on the mountains of Logan, or somewhere else of as little value as if forming a lunar freehold.

But under any circumstances whatever, it is very strange that Englishmen at home can be so gulled—or that any can be persuaded to purchase lands in America at any price, offered to them in London. If a protestant clergyman having a church in the wildest and most lawless part of catholic Ireland, was to offer his claims on his flock for tythes, for sale at auction in the mountains of Virginia, the seller would not give stronger evidence of desiring to sell what was worthless, and the buyer of being a credulous fool, than in the case of land in Virginia being sold in London.

REPLY TO "COMMENTATOR," ON MR. BAUER'S EXPERIMENTS ON DISEASES OF WHEAT.

To the Editor of the Farmers' Register.

Henrico, 9th May, 1835.

In noticing the comments of "Commentator" in the No. of the Register for this month [No. 12 of Vol. II.] on the papers contained in No. 9 of the Farmers' Register, it is not with the view of claiming any merit for the article on the supposed diseases of wheat, &c. over the signature of A. N. contained in that No., but to support the opinion then given of the articles on this important branch of vegetable pathology by Mr. Bauer, contained in the October No. of the Register, copied from the "Penny Magazine." I think it must appear evident to every unprejudiced reader of these articles, that Mr. B. has not only been successful in defining the several diseases therein stated, but in tracing out their true causes; and thereby has been enabled to point out a remedy. If there is nothing wonderful in these interesting experiments, they are at least of sufficient importance to arrest the attention of every farmer. Had Mr. B. merely stated the results of his several experiments, without detailing the way and manner in which they were obtained, there might have been room for continued doubt. But the known celebrity and scientific attainments of Mr. B. coupled with the patient investigation and highly satisfactory results of these complicated experiments, entitle them to very considerable credit. But the true way to test the full value or correctness of these results, and the remedy pointed out, is, for every farmer to try the remedy for himself. Lime water has longbeen used as a preventive from many diseases in wheat, &c.; and many respectable farmers who have used it, have attributed no small degree of benefit to it—but being ignorant of the causes producing these diseases, their remedy—though accidentally the true one, was not used to a sufficient extent to ensure the desired results. But, to use your own words, (in commenting on those experiments,) "these coincidences of accidental practice, with theoretical reasoning, are highly satisfactory; and though in these cases accident had discovered the remedy more early than science had made known the cause, it does not therefore, lessen the value of the latter mode of investigation." There are many farmers who have used supposed remedies for many years, and whom every years' experience must have told was of no use. To such, Mr. B's. experiments must be highly valuable.

I agree with "Commentator" that these and similar dissertations are comparatively useless, unless accompanied by some remedy. I think, however, that the result of Mr. B's. investigations alluded to, clearly points out a remedy, and as such, are of no mean importance. If the pages of every agricultural periodical were filled with dissertations of as important, practical, and decisive a character as are those of Mr. B., I have no doubt that many who are now anti-"book farmers," would be glad to avail themselves of the helps to be derived from such works. I do not think that the reading of quotations such as "Commentator" has favored your readers with, will tend to reduce the "bad odor" of "book farming;" but I do think that the reading to them some such articles as you have happily selected from Mr. B's. productions would; and by inducing them to try the remedy there pointed out, a few converts might be added to this species likewise; and perhaps, a few hundreds of the "thousands" now affected with this unpleasant odor, might be induced to add their names to your list of subscribers, and enable you shortly to carry into operation your proposed improvements on your valuable Register.

A. NICOL.

VITTORIA WHEAT, YIELDING TWO HARVESTS IN THE YEAR.

Loudon's horticultural and agricultural notices, last autumn, gave satisfactory accounts of the experiment tried in Somersetshire, of planting this valuable present made to his country by Sir Robert Kerr Porter, our Consular resident in that part of South America where it is native of the soil. Loudon reports it to have given great promise, both from its spring and summer sowing. In Warwickshire, we ourselves know that it succeeded so well as to produce a fine crop in July last year, though, by an accident, it had been planted a month too late; and it yielded a particularly sweet and well tasted flour, from which excellent bread was made. The proper times for sowing are, February (which gives its harvest in June,) and in June (which yields its harvest in October.)

DESCRIPTION OF A CHEAP WATER-LEVEL, AND THE MANNER OF USING IT.

To the Editor of the Farmers' Register.

In forwarding my annual subscription for your third volume in advance, I embrace the opportunity of tendering my respects to your correspondent M. N., who, in Vol. II. No. 9 of the Register, has added to the stock of information it has already afforded us, on the subject of hill-side ditches, and horizontal ploughing. In place of the rafter level, which is generally used for such purposes, he recommends a plumb level, as described in his communication. I suggest to M. N. as much better adapted to the purpose, a light tin water-level, which can be procured for $1. 25 in Richmond, on the street leading to Mayo's

Bridge, and probably in any other town. It would be found very useful in other operations, such as levelling the foundations for buildings, conducting races for waterworks, or in ditching and draining. It is a tin tube about three and a half feet in length, and three-fourths of an inch in diameter, closed at each end, with a socket affixed at right angles to the centre, for receiving a moveable staff, similar to a surveyor's. At each end of the tube, and communicating internally with it, are two upright tubes or sockets, two and a half inches long, of the same diameter, in each of which is inserted with rosin or some other adhesive substance, a small vial divested of its bottom, and furnished with a cork tied by a string to the neck, to stop it when filled with fluid, thus preventing its spilling when the level is moved. When the operator is to proceed to level a piece of ground, the tube should be filled through one of the vials with some fluid slightly colored; and having fixed his staff, and placed the level on it, he will uncork the vials, when the fluid in them will find a level by having a free communication through the tube, and the two uprights in which the vials are inserted. His assistant will be furnished with a ten-foot rod, graduated with feet and inches, which he will place at the head of a gully or other point where the levelling is to commence, in front of which he will place a piece of paper, which he will move up or down on the rod by direction of the leveller, until the top of the paper ranges with the top of the fluid in the vials, noting the elevation from the earth on the rod. He will then step eight or ten paces, or measure two lengths of the rod on the earth along the course proposed to conduct the levelling, and elevating it to a perpendicular, he will move it up or down hill, until the paper placed at the former elevation ranges with the top of the fluid in the vials. The leveller can, with great ease, move his level to range with the rod, by placing his thumbs on the mouths of the vials, and gently turning the socket on the staff. If it be wished to give a fall or rise of two inches in every twenty feet, it will be readily done by placing the paper two inches higher or lower on the rod, at each removal. In conducting a long level, if it becomes necessary to remove the station of the leveller, the assistant should keep his rod unmoved at his last station, and the leveller should advance beyond him to any suitable position, and sight back to him, continuing the same process as in the commencement. I would make the assistant carry on his arm a basket of small sticks, to mark each station of his rod, instead of employing an additional hand as proposed by M. N. After the line of level is run, the situation of the sticks may be altered at pleasure, so as to produce proper curves, to be followed by the ploughman, who will be accompanied by the leveller, to direct him, and pick up the sticks.

In levelling the foundation of a building, the level is fixed near to it, and the assistant places the end of his rod in a perpendicular position, at any given corner, of the desired height or depth, noting the number of feet and inches where his paper ranges with the fluid in the vials. He then places his staff at another corner, and the range of the top of the water in the vials will immediately inform him whether it be too high or too low, and by how many inches.

In levelling either up or down a stream to ascertain its fall, the assistant places his rod at the water's edge, and the leveller goes forward a convenient distance, sighting back to the rod-man, who notes the height from the water, in a column headed "*back sights.*" The rod-man then goes forward in advance of the leveller, who makes a forward sight, the height of which is also noted under a separate column, headed "*forward sights.*" The leveller then moves his station, sighting back to the rod-man, which is noted as above, who then moves forward in advance of the leveller, and so on alternately, until the levelling is completed, taking care to commence with a back sight, and end with a forward one. The back and forward sights will be equal in number, and after adding up the feet and inches, in each column separately, and deducting the smaller amount from the larger, the difference will be the amount of the fall. If the levelling be up stream, the amount of the back sights will be the larger. The reverse takes place in levelling down stream. The merest tyro in the science of engineering would probably laugh at this communication: but it may, nevertheless, be of service to somebody, in which event my purpose is fulfilled.

F. H,

May 17*th*, 1835.

SURFACE MANURING.

To the Editor of the Farmers' Register.

The urbanity and scientific research displayed by your correspondent W. B., in his criticisms on my remarks upon J. B's. communications, deserve a very respectful notice. He seems to possess a share of chemical knowledge to which I have no pretensions; and I shall therefore offer little more in reply, than such objections and difficulties as present themselves to my mind, in opposition to his opinions and arguments.

His first observation in regard to the hypothesis which I ventured to suggest, does not appear to me to militate against it. I was well aware of the truth which he states, that "chemical affinity only acts at insensible distances;" and that "the better the mixture of any two things having a chemical affinity, one for the other, the more rapid and perfect their combination." Now it is equally true, according to my hypothesis, that nothing which constitutes the food of plants can combine with the earth, until such substance or substances be dissolved in water. But the water will dissolve them quite as soon while lying *on*, as *under* the surface of the earth, by percolating through the manure; for in both cases this water must at an "insensible distance" from that which it dissolves. The only doubt then seems to be, whether, if the solution takes place below the surface, the food which it contains for plants will not be carried lower into the earth than it ought to be: whereas, when it is absorbed from the surface, it will go no deeper than nature intended it should. As to there being "no gas in the earth," W. B. is right in supposing I did not mean to say so, however my language—never very accurate, might have justified the inference. But my belief is, that the greater portion, if not all of those gases which constitute the food of plants, is imparted to

them through their leaves, by the atmosphere, and not the earth, which does nothing more than retain the nutritious water naturally prepared for, and imbibed by the spongioles of the roots of plants. This hypothesis explains satisfactorily, at least to myself, the chief advantage of tillage, which is, that by loosening and pulverizing the earth, the rains and the dews are more intimately mixed with its particles, and therefore longer retained. The other and only advantage is, that none but the plants designed to be cultivated, will receive and share among them, the whole of the food destined for their use.

W. B. has quoted one of Sir Humphrey Davy's opinions, I presume, because he deems it opposed to the hypothesis suggested by myself. If my presumption be right, the quotation furnishes as strong an instance as any I have seen lately, to prove how marvellously men may differ about the meaning of words and sentences; for *I* understand this extract from Sir. H. Davy's Agricultural Chemistry, (so far as it goes,) as sustaining, rather than refuting my own notions. He here asserts the superiority of manure applied in a comparatively *fresh state*, to that which has undergone *much fermentation;* so do I assert it. In what then do I differ from him? Simply in believing that the surface application is better than ploughing it under. But this difference is more apparent than real; for one of his reasons in favor of ploughing under the manure is, that "the fluid matter produced is applied *instantly*, even while it is warm, to the organs of the plant." Now this can apply only to the case of plants growing at the time of the application; but in nearly all the cases which I have supposed, there would be no plants intended for our use growing in the earth, *instantly* to receive this premature supply of food. Again; Sir H. Davy's alleged reason for speedily ploughing manure under, is, that its fermentation above ground would be prevented. So it would be upon *my* supposition, at least all but that fermentation which it undergoes while losing the natural heat acquired in the bodies of the animals that produce it, and this heat it must lose during either process. By being spread on the surface, as in the case of summer cow-pens, or by carting it out as soon as practicable, without heaping, no other fermentation takes place, but that which is unavoidable. But in the other mode, which is to collect and preserve it in heaps, for a considerable time, great additional heat must be generated and continued long enough for the escape of gaseous exhalations to a great and incalculable amount.

The "medical maxim"—"assist nature," which W. B. has suggested, will not, in my humble judgement, assist his argument much: for if the want of skill in applying it be as great among the land-doctors, (and it certainly is so,) as it but too often proves to be in the human-body-doctors, the poor old dame, had she the gift of speech, would not unfrequently have to cry out—"*non tali auxilio—egeo*"—I need no such aid. Fortunately however, in many such cases, if they be not too desperate, her "*vis medicatrix*'," or recuperative power comes in and saves her from destruction. By the way, this business of *assisting nature* is a pretty bold, not to say presumptuous undertaking, let who will attempt it. In the case of an agriculturist, he should be, (if you will pardon a pun,) very sure of his ground, or, he may do much more harm than good: and should he go to acting upon the supposed analogy between his and the medical profession, he may often commit very fatal blunders. For example: "*depletion*" by two or three different modes, is quite a favorite dogma with the faculty, whereas, our mother earth is almost always much more in want of food than physic. Again; medical gentlemen deem themselves bound to invent and apply remedies for all the various diseases and "ills that flesh is heir to;" and as these appear to be innumerable, so, nearly must be the nostrums for their cure. Now the only names of human diseases that can, by any sort of imaginary analogy, be applied to the earth, are, *the gravel* and *the consumption*. The first is nature's own creation, and past all remedy—so far as it impedes vegetation, while the latter is superinduced by the ingratitude of man himself, who, if he had any sense of retributive justice, would most assiduously attempt its cure the moment he discovered any of the premonitory symptoms.

W. B. says, "we might with the same propriety scatter our seeds to the winds, and depend upon the earth, the air, and the rains, to cover, sustain, and mature them," as "to expose manure on the surface:" and *so we might*, if nature's God had not commanded that man should both sow and till the earth, that it may produce the food necessary for his subsistence, which was produced spontaneously before his fall from his primitive state. Let it be borne in mind however, that in all uninhabited countries, as far as we know any thing about them, *every* plant or tree which is propagated by seed of any kind, that grows above ground, deposites them on the surface, where the only covering they get is formed by the falling leaves or rains; but this always proves amply sufficient to continue all their orders, classes, genera, and species, as long as time shall last. I do not mention this as a reason why we should not bury at some depth in the earth, all the seeds we plant, for all men deem this essential: but merely to call W. B's. attention to the fact, that both plants and trees are abundantly perpetuated in every part of the world of which they are natives, without any such inhumation of their seed, as he seems to think indispensable. One obvious reason why we bury them, W. B. appears to have overlooked; it is, that by so doing we can much better bestow on them that cultivation which is designed to prevent any thing else from growing where they do, that they alone, (as I before remarked,) may imbibe the food intended for them.

The inference which he draws from this universal practice of covering seed in the earth being deemed necessary, is, that covering manure is also necessary. But surely this is a *non sequitur*, unless he had proved, that the food of plants contained in manure, could not be imparted to them in any other way. The woody portion of putrescent manures, if left on the surface of the earth, unquestionably requires a longer time to decay than when it is buried below the surface; but in *either situation* it *will* decay. Not until then, can water so act upon it as to dissolve such parts of it as are capable of conversion into the food of plants. The only inquiry, therefore, relevant to the case is, *when* is it best that this solution should take place—some time before the plants to be benefited by it are even so much as planted, (which

must be the case with all buried manure, unless it be *that* ploughed under immediately before sowing or planting;) or, that it should take place when, according to Sir H. Davy's dictum, "the fluid matter produced is *instantly* applied, even while it is warm, to the organs of the plant?" Admitting Sir H. D. to be right, I consider the correctness of the latter opinion, to be absolutely demonstrated, so far at least as such assertion can properly be applied to *this*, or any similar subject. To this, however, as to many others, we may truly apply the scholastic adage, "*grammatici certant, et adhuc judice lisest;*" and this being the case, I am determined the present seeming controversy shall, so far as I can help it, "break no squares" between your intelligent correspondent W. B. and your old friend

J. M. G.

THE WHEAT CROP IN FAIRFAX.

To the Editor of the Farmers' Register.

I seeded 290 bushels of wheat after the following manner. Upon the 6th day of October I began to seed upon 87 acres of oat fallow, twice ploughed, which was seeded with 145½ bushels of wheat, consisting of Baltimore bearded, early red, and New York white flint. Two good harrowings put in the seed—all was completed upon the 12th. Fifty acres of this land would have brought good tobacco. The Baltimore bearded is an entire failure, the fly having scarcely left a plant. The early red may make three for one—and the white flint eight for one.

I then seeded a field of 62 acres, dry sandy land, which when enclosed some 20 years past, would produce about 2½ or 3 bushels of corn to the acre. My cattle had been fed upon it for two winters, and it had received much farm-yard litter—and since being enclosed, had received some deep three horse ploughings. Eighty-one bushels of early red was seeded in the field upon two good ploughings, the grain was harrowed in, and all done and finished upon the 20th. This field perhaps is equal to one-half a crop—say 5 or 6 bushels to the acre. The balance of my crop was seeded upon corn land, and completed upon the 6th of November; and may give 5 or 6 for one acre. After this I seeded 40 bushels of rye, which, though young, promises much better than the wheat.

My brother farmers charge the loss of their wheat upon the severity of the winter. This is not my excuse—for the winter passed over us, and left our wheat plants all standing. But nothing in my memory has equalled the destruction of the fly. We have measurably dodged this terrible enemy of late years by seeding after the 8th of October; but they are evidently not to be dodged always—but acting up to the rules of a higher or larger order of devastators, they take all * * I am casting about for a corrective, and think I shall call to my aid 100 acres of rye, which, like the democracy, will overwhelm all enemies, and though the victory will be but rye, it will be exactly that much better than nothing.

X. Y. Z.

Fairfax, May 20th, 1835.

For the Farmers' Register.

ON MAKING RICE ON DRY LAND.

In my paper on the subject of cultivating *corn*, [Far. Reg. p. 634, Vol. II.] I stated the article of *rice*, as entering into the crop. My reason in part, as you will have no doubt discovered, for introducing this article amongst others, was that it is found not to affect in any unfavorable way, the growth of the corn, &c.—and also, that I have satisfied myself, from repeated trials, that this mode of raising it, is calculated to produce that grain in the greatest perfection.

The rice cultivated throughout this state on highland, is in every respect similar to the rice plant of South Carolina. It is found to grow well in every soil we have, from the pipe clay ground of the pine woods, to the black fat limestone land of the great cane brake. In the latter, however, it excels—although from some fair trials I have seen, and indeed assisted in making, I am compelled to believe that pine land, (gray) with a good red clay foundation, moderately prepared by manuring, lime, &c., will equal in production, for quantity or quality, even the fat black land of the great cane brake. It is the most generous grain I know of—will meet successfully a greater variety of seasons and soil than any other. I know of no soil or situation perfectly unfavorable to its production, and it is never made, with our planters, any question in what land they will put it; but what spot is most convenient on the farm of the second year's land. On every species of pine land, with a little cow-penning, cotton seed manure, or any other decomposed animal or vegetable matter, it grows luxuriantly, from four to five and a half feet in height, and produces astonishing crops of grain; say from forty to one hundred bushels of shell rice, that is rice with the husk on, per acre.

The rice produced on our uplands, I am satisfied, is superior in quality to the water raised rice of Carolina—especially that which we raise on the calcareous soils. When boiled in pure water, it exhibits a most decided superiority in the glutinous over the watery principle. I could not possibly admit any comparison in the quality of the two productions. The grain of what we call the "big white," is remarkably large, both in the hull and when cleaned—although the "red bearded" is by some thought superior. Both of those kinds, with the "small white," grow well on dry upland. The operation of hulling or cleaning, is performed with the common pestle and mortar, or in our little tub mills, by partially raising the stones when they become dull and want picking. I have had it cleaned under those circumstances, as handsomely as any table would require.

It may be proper to add, that in boiling the upland rice raised in this section of country, it is found to absorb, or to make a mass at least one-eighth greater than the rice of South Carolina, or any other, where water is employed as an agent in its production.

The straw is found admirable winter forage for horses, mules, oxen, and cows; but especially for young cattle—and a prodigious mass of it is produced from an acre of land. A sheaf of rice passed through the cutting box and given daily, with her other food, to a milch cow, in the winter, is found to produce superior milk and butter. We raise it with so much ease, that we find it econ-

omy to give it to our poultry, and pigs, for both of which it is admirable, given in the hull. It is thrashed out with great ease over a bench properly placed, or a barrel.

It is the first article I plant in the spring. If planted alone, and if planted early as possible, it will be off the ground before the arrival of the *rice bird*. Like other grain, I have found it superior, when cut (if for table use,) just *before it is perfectly ripe*. In this case the straw is cured when still *green*, consequently, *highly nutritious*, and when cured still retains its color.

In cultivating this grain, the ground should be turned over in January—harrowed *with* the furrow, and the first favorable state of the *weather* and *soil* in February or March, lay the ground off in drills with a *half shovel*, for the purpose of having the seed deposited as deep as possible, so that, after it is hilled up, the roots may be *deep* in the ground, and which, in case of a *drought* about filling time, will secure it. This last precaution has been the result with me of several experiments. The drills may be as near as eighteen inches apart, if the rice is cultivated alone, and it can be covered with a small board fixed to a scooter plough stalk, or with the hoe or rake. The first is the most expeditious, and requires no other attention than to cover shallow. When six to nine inches in height, plough with a scooter between the rows with a small pony or mule, and finish it off with the hoe, drawing the dirt to it. If the land is light and loose, one ploughing is sufficient—keeping the ground loose and clean is all that is required. It is cut with the sickle, in dry, hot weather, and put up in sheaves the next day, and stacked or housed.

I have had it cut down with the frost twice in the spring, without any bad consequences. I planted once in the *twelve* days, and made a fine crop, remarkable for weight. It was cut down by frost twice; I was making experiments to defeat the *rice bird*, but found that planting in February, or even March, and cutting as before stated, will always find the crop in the barn on his arrival.

I am assured that you will find no difficulty in raising this valuable grain in your vicinity. All difficulty as regards preparing it for table use, is done away, by substituting the wooden block in lieu of the stone—the first being furrowed out in the same manner. Attached to a small horse mill, for my own grinding, I have four pestles, worked in as many mortars, that would clean for a whole neighborhood.

Where I have ground to put in corn of the second year after being cleared, and especially if I can afford a little manure to the land, I would always raise my rice as before stated, with the corn. When the land is not disposed to produce grass, it is made with less labor, for the production, than any crop I know of.

AGRICOLA.

Alabama, March 15, 1835.

SEASON AND STATE OF CROPS DURING MAY—PROSPECTS.

Cold weather has continued to predominate generally through this month, though intermixed in the latter half with some very warm. The corn crops are very backward, and look badly. To cotton, in this region, the cold weather has been still more injurious. But the great loss of Virginia will be in the wheat crop. The Hessian fly has seized on it every where that we have heard from in the state, (probably in consequence of the feeble state of the plants,) and promises to destroy half the remnant that the severity of the winter had spared. The few crops which have come under our personal observation, cannot yield more than half of what might have been expected in a good season—and accounts equally unfavorable—some much more so—have been received in the incidental notices of correspondents from every region of the state where wheat is an important crop. After making due allowance for the fears of writers being heightened beyond the actual and abundant grounds for despondency, it can scarcely be expected that more than half a crop of wheat will be made. A few extracts from private letters will show the kind of information upon which our opinion is founded.

From Goochland, May 19. "Our wheat crops are deplorably bad on James River—the best low grounds even worse than the high lands. I shall now be content with one-third of a crop. The fly has been committing sad ravages for the last ten days; and at the proper time we may anticipate rust. The corn, so far, does not stand very well—and tobacco plants small for the season, and not very abundant; so that really our prospects are gloomy. The oats and clover alone promise well."

A correspondent from the same county, (near Johnson's Springs,) writes (May 18th,) as follows: "The growing crop of wheat is offered by many of my neighbors for the seed sown, and in some cases less. I hope the fatality has not been very extensive, and that other regions may be blest if we are destitute."

Another from King and Queen (May 10th) speaking on another subject, incidentally remarks: "I should like to submit to you and your correspondents, a few inquiries as to the best mode of seeding wheat to prevent its being killed by frost, for my crop, although put in with some care, is an entire failure."

From Fairfax, May 7th. "You may report with safety that not more than a third of a crop of wheat will be made in this county."

From Fauquier an account equally bad was received, but of earlier date. Of the crops of the great wheat growing county, Frederick, something has been stated in the communication (p. 30,) of a "Frederick Farmer"—and a still more desponding view has been given in a private letter from another farmer of that county, dated May 9th.

The bad state of the wheat crop, added to the high price of cotton, (and perhaps also the rising rage for speculation in general,) have combined to give a new impulse to the emigration of the farmers of this state to the South West—and thereby to increase the drain, always flowing from the heart's blood and vital power of Virginia. No country can prosper while continuing to lose annually so much of its accumulated wealth, and so many of its most energetic and useful citizens. It is necessary for those who remain—who will "die in the last ditch" before they will abandon their native land—to use every exertion to aid the general improvement and prosperity of agriculture, as the only means to arrest general ruin—and this end is

not more called for by patriotism, than by sound calculations of private and pecuniary interest. *Our* individual share of this general effort recommended, is making through the Farmers' Register—and even that seems likely to be cramped and weakened by the present prospects, and extent of emigration. But this effort will not on our part be relaxed, while its continuance is encouraged by public favor—and if that should cease—this work will at least serve as *our "last ditch,"* in which to die, so far as it relates to service to, or connexion with the public.

From Malte Brun's Geography.

PHENOMENON OF THE BLACK WATERS.

In the upper part of the region of this river (the Oronoke, in South America,) between the third and fourth north parallels (of latitude,) nature has several times displayed the singular phenomenon of what has been named Black Waters. The waters of the Atabaco, Temi, Tuamani, and Guainia, are of a coffee color. Under the shade of the woods of the palm tree their color becomes of a deep black, but in transparent vessels it becomes of a golden yellow color; the images of the southern constellations are reflected in it with singular brilliancy. The absence of crocodiles and of fish, a greater degree of coolness, a smaller number of musquitoes, a healthier air, distinguish the region of the black rivers. They probably derive their color from a solution of carburet of hydrogen, resulting from the decomposition of the multitudes of plants that cover the soil through which they flow.

[The appearance described above is always found in the waters of many sluggish streams, and of mill-ponds or swamps, in lower Virginia. Blackwater Swamp, and its branches, and the lake and canal of the Dismal Swamp, are well known, and remarkable examples. We are not able to appreciate properly the supposition above of the cause of this coloring. But we had before attributed this effect simply to the solution, or suspension in the water, of vegetable extract derived from the vast quantity of fallen leaves and other vegetable substances, over or among which the water flows. The same tinge is often seen in the smallest pools of recent rain water, after standing a short time on poor woodland. So far as our observation has extended, these colored waters are never found, either flowing or standing, over calcareous soil, or where any notable amount of lime in any form is present in the soil; though such soils may be most abundantly supplied with vegetable matters, which yield their extract to every soaking rain. These different circumstances have appeared to us as additional proofs of the chemical power of calcareous earth to combine with and hold this vegetable extract, and to use it for fertilizing the soil—instead of its flowing off, in waste, where enough lime for this purpose is not present. These facts and deductions would have been used as proofs in another place, but for an unwillingness to resort to facts, the extent of which was so imperfectly known. Observing the statement above, has induced us to present the subject here, with the view of its drawing forth further information, or correction from others.]

For the Farmers' Register.

COMMERCIAL REPORT.

The demand for every article of domestic produce continues brisk, and prices generally have advanced. The unfavorable aspect of the wheat crop, gave rise to some speculation in flour, and at one period during this month, the price had risen full one dollar per barrel. Sales were made in a few instances as high as $6.25 per barrel, but some reaction has since taken place, and the price may now be quoted $5.75. It is stated that the wheat crops in the northern and western states are not so much injured as had been apprehended —but there is little doubt that the deficiency in Virginia will be great, and that the market will open at a higher price than for many years.

The price of tobacco has also advanced during the present month. The sales reported at the inspections, embrace all rates from $5.50 to $17 per 100 lbs. Purchases are based, not on the existing prices in foreign markets, but on the expectation of advance; and the spirit of speculation which is unusually active, may not find itself sustained abroad. Such at least has frequently been the result.

Cotton has more than sustained the prices of last month. The current sales in Petersburg of fine quality, have been at 18 cents. Choice has commanded 18½—and the range of quotations is 16½ to 18½. The quantity received in the various ports of the United States to the 1st May, is about 1,130,000 bales, against about 1,000,000 at the same period of 1834. But this success has been in a great measure absorbed by increased consumption.

Stocks of almost every description command high prices. That of the United States' Bank, although its charter is about to expire, has advanced to 113.

The success of the Petersburg Rail Road is pretty well demonstrated by a recent declaration of 4 per cent. dividend for six months, and an advance in the prices of its stock of 15 to 20 per cent. during the current year.

X.

May 27.

TO SUBSCRIBERS AND CORRESPONDENTS.

In consequence of the increased amount of matter recently furnished by our correspondents, most of the pieces have necessarily been kept back longer than has been usual.

To avoid a continuance of such delay, and also for several other considerations of convenience, the 2nd No. will issue on the 15th of June, and the 3rd at our regular time of the 1st of the succeeding month, July —after which the publication will continue, as punctually as before, on the first of each month. With this view, this No., though not issued before June 1st, is dated in May.

GEOLOGICAL SURVEYOR.

Wm. B. Rogers, Professor of Natural Philosophy and Chemistry in the College of William and Mary, has been appointed by the Board of Public Works to make the geological *reconnoissance* of Virginia, as directed by the act of last session of the legislature.